COMPAQ

ProLiant ML750 Servers

Setup and Installation Guide

First Edition (March 2001)
Part Number 175746-001
Compaq Computer Corporation

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About This Guide

Purpose and Scope

This guide is designed to be used as step-by-step instructions for installation, and as a reference for operation, troubleshooting, and future upgrades for Compaq *ProLiant*™ ML750 servers.

WARNING: To reduce the risk of personal injury from electrical shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs could create conditions that are hazardous.

IMPORTANT: The installation of options and servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

⚠ Important Safety Information

Before installing this product, read the *Important Safety Information* document provided.

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Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to *type* information, type the information **without** pressing the **Enter** key.
Enter	When you are instructed to *enter* information, type the information and then press the **Enter** key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

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NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:

This symbol in conjunction with any of the following symbols indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a Network Interface Connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

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These symbols on power supplies or systems indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

Weight in kg
Weight in lb

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installation.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

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Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations

Compaq Technical Support

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed in the *Worldwide Telephone Numbers* booklet included with your product or listed on the Compaq website. Access the Compaq website by logging on to the Internet at

http://www.compaq.com

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Compaq Survey Utility Information

Compaq Website

The Compaq website has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq website by logging on to the Internet at

http://www.compaq.com

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Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Related References

The following Compaq documentation can be referenced:

- Server Rack documentation
  - 9000 Rack Series Products Audio-Visual (AV) CD Kit (shipped with Compaq racks)

    NOTE: The Rack 7000/4000 Series Rack Resource CD Kit ships with all Compaq 7000 and 4000 Series Racks.

  - Rack Builder Pro Configuration Tool CD (available on the Compaq website or can be ordered with the Rack Resource CD Kit)
  - Rack Products Documentation CD (available on the Compaq website or can be ordered with the Rack Resource CD Kit)
- ROM-Based Setup Utility Documentation
  - *Compaq ROM Based Setup Utility User Guide* (available on the Documentation CD)
- Factory Installed Server Documentation

  Compaq Factory-Installed Operating System Software User Guide (shipped with each factory installed operating system)

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Chapter 1

Introduction

Compaq ProLiant ML750 Server

The *ProLiant*™ ML750 server is the ultra-capacity data center server with breakthrough 8-way scalable performance and the highest levels of internal fault-tolerant storage for 7x24 environments.

New ProLiant ML750 servers scale from one to eight Intel Pentium III Xeon processors and up to 16 GB of SDRAM memory. Combined with the latest high-availability features, including push-button PCI Hot Plug, hot-plug redundant fans, hot-plug redundant power supplies, Compaq Remote-Flash Redundant ROM, and redundant Processor Power Modules, the ProLiant ML750 server offers optimum performance for your most demanding 7x24 applications.

New Technology

The Compaq ProLiant ML750 server has several new technology features.

Compaq ROM–Based Setup Utility

The Compaq ROM–Based Setup Utility (RBSU) will automatically configure the system based on the operating system selected. RBSU supports a wide range of customizable configuration features. RBSU replaces the System Configuration Utility feature.

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Faster Processor Support

The ProLiant ML750 server offers support for 900 MHz Intel Pentium III Xeon processors.

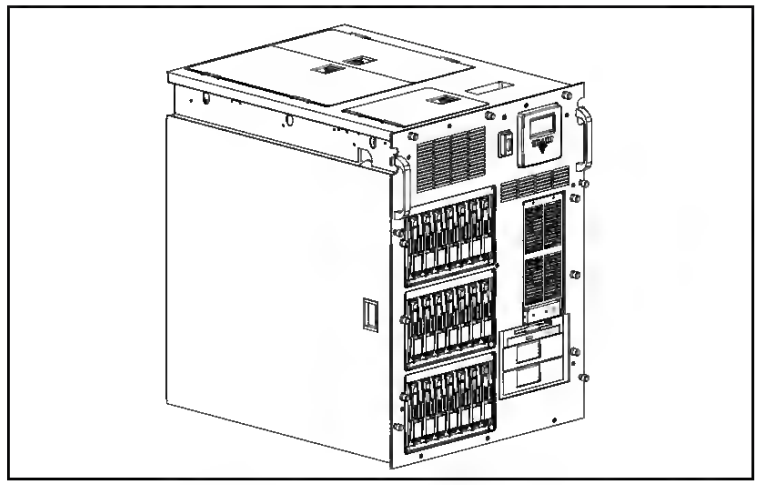

Figure 1-1. Compaq ProLiant ML750 server

Features

The following features are available on Compaq ProLiant ML750 server models.

Processors and Redundant Processor Power Modules

- The ProLiant ML750 server supports up to eight Intel Pentium III Xeon processors
- Optimal thermal dissipation
  - Evaporator plate and water-cooled heat pipes are attached to each processor
  - Three air baffles in the processor area maximize airflow

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- Processor Power Modules
  - One redundant Processor Power Module per processor
  - One Processor board Processor Power Module to power the board for higher availability
- Two Cache Accelerators for performance enhancement

System Memory

- Error Checking and Correcting (ECC) SDRAM Memory with single-bit error correction and detection down to a single DIMM and multibit error detection ECC
- Expandable to 16-GB (16 × 1-GB DIMMs)
- Supports up to eight memory banks with each bank consisting of two DIMMs. One bank is installed or removed at a time. Each DIMM of a given bank must be the same 9-digit Compaq part number.
- Supports 100-MHz registered SDRAM 128-MB, 256-MB, 512-MB, and 1-GB DIMMs

Expansion Slots

Eleven I/O expansion slots on three PCI buses:

- Primary PCI Bus (33-MHz) with one 32-bit PCI Hot Plug slot and three 64-bit PCI Hot Plug slots
- Secondary PCI Bus (33-MHz PCI) with five 64-bit PCI Hot Plug slots
- Tertiary PCI Bus (66-MHz PCI) with two 64-bit PCI Hot Plug slots

---

IMPORTANT: If you install a Remote Insight Board/PCI, Compaq recommends placing it in Slot 1. If no Remote Insight Board/PCI is installed, any 32-bit PCI board may be used in Slot 1.

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PCI Hot Plug

PCI Hot Plug provides the ability to remove, replace, upgrade, and add PCI expansion boards without powering down the server. Any PCI board can be placed in a PCI Hot Plug slot. PCI Hot Plug device drivers and operating system support, however, are required to enable PCI Hot Plug.

The PCI Hot Plug button allows for PCI Hot Plug access directly at each PCI slot. A PCI Hot Plug button is located above each PCI slot, providing PCI Hot Plug control directly at the server without the use of the PCI Hot Plug utility software.

NOTE: To optimize the management features of the Remote Insight Board/PCI, it is not hot-pluggable.

For more information about PCI Hot Plug, refer to the server Documentation CD.

Redundant Hot-Plug Power Supplies

NOTE: Depending on the server configuration, three power supplies may be required for N+1 redundancy.

- Supports 1150/500-W hot-plug redundant power supplies.

WARNING: Hot-plug power supplies are not designed to be installed with AC current connected to the power supply. To prevent personal injury or damage to the equipment, be sure to disconnect the power supply from AC current prior to its removal or installation.

- Power supplies are load-balancing and have microcontroller monitoring for advanced health and configuration management.
- Supports up to three power supplies. Depending upon the system load configuration, more than one power supply may be required to power the system. See the section, "Power Requirements," in Chapter 2 to determine power supply requirements.
- A power supply security bar and a padlock provide additional security.

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Hot-Plug Redundant Fans

ProLiant ML750 servers include hot-plug redundant fans that provide high-level thermal protection. A failed fan generates a system alert and triggers the secondary (or redundant) fan to take over automatically. Hot-plug redundant fans protect the various server components from overheating and the system from possible interruption.

Internal Hot-Plug Drive Bays

- The ProLiant ML750 server supports up to three ProLiant ML750 Ultra3 SCSI internal drive cages.
- The ProLiant ML750 internal drive cage is capable of supporting a maximum of seven 1-inch Ultra3 hot-plug drives (totaling 21 drives with all three 1-inch drive cages installed).
- Hot-plug drives may be any storage capacity of 9.1 GB or greater.

Internal Removable Media Drive Bays

Supports three non-hot plug removable media drive bays:

- One third-height drive bay occupied by a slimline 3.5-inch diskette/IDE CD-ROM drive combination
- Two half-height 5.25-inch drive bays available

Disk Controllers

Supported disk controllers include:

- Up to two Smart Array 4250ES Controllers or other Compaq array controllers with Extended SCSI. A Compaq array controller with Extended SCSI provides high performance and RAID fault tolerance. The Compaq array controller with Extended SCSI is cableless and connects to the three Ultra3 SCSI buses on the I/O board for use with internal mass storage. SCSI cables are preinstalled between Ultra3 SCSI connectors on the I/O board and each internal drive cage installed. Adding a redundant Compaq array controller with Extended SCSI allows the server to continue functioning in the event of an array controller failure.

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- One or more Smart Array 3200 or 4200 Controllers, which may be installed in any slot. The Smart Array Controller supports up to two internal drive cages or external mass storage devices and requires a SCSI cable connection between the controller and the drive cages or external mass storage devices.
- One or more Dual-Channel Ultra2 Controller cards for use with internal removable media drive bays, internal drive cages, or external mass storage devices.

NOTE: The ProLiant ML750 server does not include an integrated SCSI controller.

Network Controllers

- Supports a dual-port 10/100 TX UTP controller on a PCI local bus. Depending on the model, features of the controller may include:
  - Two RJ-45 connectors for 10BaseT or 100BaseTX Ethernet
  - Upgradable with a daughter card to an additional two ports of 100BaseTX Ethernet, a single port of 100BaseFX, or a single port of Gigabit Ethernet SX or LX Fiber support
  - Auto-Negotiation for hardware selection of the highest operating speed
- Redundant Network Controller software that supports a redundant NIC configuration is available. This feature may be used with one dual-port, two dual-port, or two single-port NICs.

NOTE: Remove the terminator plug from the second RJ-45 connector when using the dual-port capabilities.

Redundant NIC software is available on the Compaq SmartStart and Support Software CD that was shipped with your server. For more information concerning the network controller, refer to the Compaq website:

http://www.compaq.com

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Supported Interfaces

- Wide Ultra2 SCSI Very High Density Connector Interface (VHDCI) connector
- Wide-Ultra SCSI-3 (VHDCI)
- Serial (two connectors)
- Video
- Parallel
- Keyboard
- Mouse
- Dual-port 10/100TX UTP Ethernet (two RJ-45 connectors)
- Gigabit Ethernet (with the Gigabit daughter card option installed on the NIC)

Video

- Integrated PCI Video Controller provides maximum resolution of 1600 × 1200 noninterlaced resolution with 2-MB memory
- From 16 to more than 16.7 million colors, depending on graphics mode
- Features 2D, 3D, and video acceleration
- Supports EGA, SVGA, and VGA graphics resolution

Warranty

- Three-year Parts, Labor, and On-Site Limited Warranty with next business day response
- Pre-Failure Warranty on processors, memory, and hard drives (requires installation of *Compaq Insight Manager*™)
- For additional service and support offerings, visit the Compaq website:

  http://www.compaq.com

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Major Hardware Options

The ProLiant ML750 server supports a wide range of server hardware options. Compaq server options are available from a Compaq reseller or authorized service provider. Additional information on Compaq servers and options can be found on the Compaq website:

http://www.compaq.com

This guide provides detailed installation instructions for the following server options:

- Intel Pentium III Xeon processors
- SDRAM DIMM memory
- Cache Accelerators
- Redundant Processor Power Modules
- Compaq array controllers with Extended SCSI
- Other I/O expansion boards (including PCI expansion boards with PCI Hot Plug driver support)
- Hot-plug redundant power supplies
- Hot-plug hard drives
- DLT tape drives and other removable media
- Remote Insight Board/PCI
- Remote Insight Lights-Out Edition

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Server Configuration and Management

Compaq offers an extensive set of features and tools to support effective server configuration and management. Some are listed below:

- Compaq *SmartStart*™
- Compaq ROM-based Setup Utility
- Compaq Remote-Flash Redundant ROM
- Microsoft Windows 2000 Utilities
- Microsoft Windows NT Utilities
- Novell NetWare Utilities
- Compaq Insight Manager
- Compaq Integrated Management Log
- Compaq Integrated Management Display

Compaq SmartStart

Compaq SmartStart, which is located on the SmartStart and Support Software CD, is the intelligent way to configure your Compaq server with Microsoft, Novell, and SCO system software. SmartStart uses a step-by-step process to configure the server and to load the system software, thereby achieving a well-integrated server and ensuring maximum dependability and supportability.

For information about SmartStart, refer to the Server Setup and Management pack included in the shipping box.

Compaq ROM–Based Setup Utility

The Compaq ROM–Based Setup Utility will automatically configure the system based on the operating system selected. RBSU supports a wide range of configuration customization features, including the following:

- Selection of a primary operating system from a list of supported operating systems
- Selection of a Primary Boot Controller from a list of Mass Storage Devices installed
- Configuration of embedded system devices such as serial, printer, and mouse ports

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- Configuration of standard interrupts (IRQs) for PCI devices
- Setting of the date and time
- Configuration of the IMD and system asset text
- Automatic resolution of resource conflicts in areas such as port addresses and interrupts (IRQs)
- Storage of configuration in nonvolatile memory

RBSU comes preinstalled in the system ROM embedded on the server. It has embedded support for English, French, German, Italian, Spanish, and Japanese languages.

NOTE: Systems that use RBSU do not support the System Configuration Utility. For additional information on using RBSU, refer to the *Compaq ROM Based Setup Utility User Guide*.

Compaq Remote-Flash Redundant ROM

The Compaq ProLiant ML750 server is equipped with a Remote-Flash Redundant ROM that gives the system the ability to recover the last known good system ROM in the event that the current system ROM has been corrupted. When the server leaves the factory, both system ROMs contain the same image.

Microsoft Windows 2000 Utilities

Compaq servers running Windows 2000 take advantage of several utilities that provide detailed system information and offer special capabilities.

- Compaq Array Configuration Utility
- Compaq Power Down Manager
- Compaq Power Supply Viewer
- Compaq Integrated Management Log Viewer
- Compaq Integrated Management Display Utility

The utilities are provided on the Compaq Support Paq for Microsoft Windows 2000.

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Microsoft Windows NT Utilities

Compaq servers running Windows NT take advantage of several utilities that provide detailed system information and offer special capabilities.

- Compaq Array Configuration Utility
- Compaq Advanced Network Control Utility
- Compaq Fibre Fault Isolation Utility
- Compaq Cluster Verification Utility
- Compaq PCI Hot Plug Utility
- Compaq Power Down Manager
- Compaq Power Supply Viewer
- Compaq Integrated Management Log Viewer
- Compaq Integrated Management Display Utility

The utilities are provided on the Compaq Support Paq for Microsoft Windows NT 4.0. For information, refer to the *NTREADME.HLP* file included in the Compaq Support Paq.

Novell NetWare Utilities

Compaq servers running Novell NetWare take advantage of the following utilities:

- Compaq Power Supply Viewer (with Power Down Manager)
- Compaq Integrated Management Log Viewer (with IMD Online Configuration)

This utility is provided as part of the Compaq Support Paq for Novell NetWare.

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SCO UnixWare Utilities

Compaq servers running SCO UnixWare take advantage of the following utility:

- C22SSD Utility

This utility is provided as part of the Compaq Extended Feature Supplement (EFS) for SCO UnixWare. The EFS is available on the SmartStart and Support Software CD.

Compaq Insight Manager/Insight Manager XE

Compaq Insight Manager is a systems management tool delivering performance, configuration, and fault management for Compaq servers and clients. Compaq Insight Manager has two components:

- Compaq Insight Manager software, which runs on the management console
- Compaq Insight Manager agents (operating system–specific), which run on the server or managed desktop client

Compaq Insight Manager features an easy-to-use graphical interface and includes online documentation and context-sensitive help. Key features include:

- Server fault condition alerts
- Server performance and fault condition monitoring
- Server security and configuration control
- Remote control of the server
- Rapid recovery services

For information concerning Compaq Insight Manager, refer to the Server Setup and Management pack shipped with your server.

Compaq Web-Based Management

Compaq Web-Based Management allows you to access your managed Device List and the Compaq Insight Manager Alarm Log with a Web browser, either locally at the management console or from another machine. If you have devices that are running Compaq Insight Management Agents v4.x, you can also view the device data using a browser.

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Two buttons have been added to the button bar in Compaq Insight Manager. One button launches your browser with the Device List displayed; the other button launches your browser with the Alarm Log displayed.

For Web-enabled devices (devices that are running Compaq Insight Management Agents v4.x), a task will also appear in the Task List for viewing Web data. Right-click on the device in the Compaq Insight Manager Device List to display a device specific menu and open the Task List or directly select View Web Data. Selecting the View Web Data task launches the browser with data for the device displayed.

Compaq Integrated Management Log

The Compaq Integrated Management Log (IML) records events and stores them in an easily viewable form. The IML records hundreds of events and then marks each event with a time stamp. For more information concerning the IML, see Chapter 7, "Integrated Management Log."

Compaq Integrated Management Display

The Integrated Management Display (IMD) is a server management tool delivering fault, service, and configuration capabilities in an easy-to-use, integrated hardware display. IMD features include:

- POST (Power-On Self-Test) messages
- User-defined administrative information
- Configuration information
- System alerts and event descriptions

For information about the Integrated Management Display, see Chapter 7, "Integrated Management Log."

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Security

For detailed information concerning security features, refer to the server Documentation CD.

Software Security

These software security features are established through the Compaq ROM-based Setup Utility:

- Administrator password—prevents changes to the configuration unless you enter the password.
- Diskette drive control—enables and disables the diskette drive. When disabled the diskette drive will not read, write, or boot.
- Diskette write control—enables and disables diskette write functions. When disabled will not write, but boot and read functions are still available.
- Keyboard password—locks out the keyboard preventing unauthorized access to Compaq servers. When the keyboard is locked out it prevents logins or commands until the proper password is entered.
- Network server node—permits system startups from a hard disk or network server while the keyboard and mouse are disabled.
- QuickLock—disables the keyboard and mouse without exiting the application. The application remains in view on the monitor screen but you cannot access it.
- Serial parallel interface control—blocks the unauthorized transfer of data through the integrated serial and parallel ports.

Hardware Security

These hardware security features are provided:

- Easy one-key access to all areas of the server
- Power supply security bar with padlock
- PCI Hot Plug access door lock with key to protect hot-plug boards
- I/O Fan access door lock to protect hot-plug I/O fans

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Diagnostic Tools

Some of the software and firmware diagnostic tools include:

- All diagnostic LEDs viewable from the exterior
- Power-On Self-Test (POST)
- Diagnostics (DIAGS) and System Inventory (INSPECT)
- *ROMPaq*™ utilities to upgrade flash ROMs
- Array Configuration Utility (ACU)
- Integrated Management Display (IMD)
- Integrated Management Log (IML)
- Advanced Diagnostic Utility (ADU)

For information about Compaq diagnostic tools, refer to either the *Compaq Servers Troubleshooting Guide* or the server Documentation CD included in the Documentation box pack of the shipping box.

Routine Maintenance

For information concerning routine maintenance and safety precautions, refer to the server Documentation CD included in the Documentation box pack of the shipping box.

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Chapter 2

Server Installation

This chapter provides the procedures required to prepare a ProLiant ML750 server to be mounted in a Compaq or an industry-standard 19-inch rack and to install the server in the rack.

Installation Overview

Installing the server in the rack requires the following steps:

1. **Select a site and unpack the server, keyboard, and mouse.** See the "Optimum Environment" and "Shipping Boxes Contents" sections in this chapter.
2. **Remove the power supply shipping bracket.** See the "Removing the Shipping Bracket" section in this chapter.
3. **Install any expansion boards or otber options, sucb as additional memory, hard drives, and external storage devices (optional).**

   You will need to run the ROM-based System Configuration Utility after you install some hardware options, with the exception of additional memory and most PCI boards. Refer to the Server Setup and Management pack shipped with your server to run the ROM-based System Configuration Utility. See Chapter 4, "Installing Hardware Options," to install many of the major options.
4. **Install tbe server in a rack.** See the instructions in the remaining sections of this chapter.

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5. **Verify switch settings for processor hoard switches and the system configuration switch, and SCSI ID settings for DAT or DLT drives or other SCSI media devices, if installed.**

   Refer to the Compaq ProLiant ML750 Server Hardware Installation and Configuration poster included in the shipping box or to the access panel labels on the inside of the side and top access panels of the server. Information may also be found in Appendix H, "Processor Board and I/O Board," or in your option documentation.

6. **Connect the cahles for the keyhoard, mouse, monitor, network, storage, and power.** See the "Cabling the Server" section later in this chapter.

   NOTE: For server with factory–installed operating systems skip steps 7 and 8.

7. **Turn on the server and insert the SmartStart and Support Software CD to configure the server.** To load the CD, see Chapter 6, "Configuring the Server." For the SmartStart and Support Software CD installation procedures, refer to the Server Setup and Management pack shipped with your server.

8. **Install Compaq Insight Manager to manage the server.** For the Compaq Management CD installation procedures, refer to the Server Setup and Management pack shipped with your server.

Optimum Environment

When installing your ProLiant ML750 server in a rack, certain space and power requirements and temperature standards must be met.

- Space Requirements
- Power Requirements
- Grounding
- Temperature Requirements
- Airflow Requirements

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Space Requirements

Consider the following items when deciding where to install your Compaq rack:

- Clearance in the front of the rack should be a minimum of 25 inches (63 cm) for servicing.
- Clearance in the back of the rack should be a minimum of 30 inches (76 cm) to allow for servicing and for adequate airflow.

Power Requirements

WARNING: To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority with jurisdiction over your facility wiring and installation requirements.

IMPORTANT: Due to the 100 to 240 VAC electrical rating of each power supply, some local electrical authorities may require either one 15-Ampere circuit for each power supply or one 20-Ampere circuit for each pair of power supplies.

- The power load should be balanced between available AC supply branch circuits.
- The overall system AC current load must not exceed 80 percent of the branch circuit AC current rating.
- If power strips are used, the load should not exceed 80 percent of the electrical current rating on the power strip.

The installation of this equipment shall be in accordance with local/regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by the National Electric Code (ANSI/NFPA 70, 1993) and the code for Protection of Electronic Computer/Data Processing Equipment (NFPA-75, 1992).

For electrical power ratings on options, refer to the rating label on the product or user documentation supplied with that option.

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Power Supplies

The ProLiant ML750 server supports up to three power supplies depending upon the system load configuration. Use Table 2-1 as a guide to determine the number of power supplies needed for your server. The configurations shown are only examples. Power consumption for individual components may vary.

Table 2-1
Power Supply Support Provided for System Configurations

Power Supplies	Power Line Type	Processors	Hard Drives	Memory	PCI Expansion Cards
1	110	1 to 2	2 to 4	256MB	1 to 3
1	220	1 to 4	15 to 21	256MB to 4GB	3 to 8
2	110	1 to 4	5 to 9	256MB to 4GB	3 to 6
2	220	1 to 8	15 to 21	256MB to 16GB	3 to 11

Power supply advanced features include:

- Auto Line Sensing capability (no switch is needed to select the appropriate line voltage)
- Power Supply Viewer Utility under Microsoft Windows NT and Windows 2000
- Power Down Manager Utility under Microsoft Windows NT and Windows 2000
- Power Supply Utility under Novell NetWare

The utilities developed for Microsoft NT and Windows 2000 are provided as part of the Compaq Support Paq for Microsoft Windows NT 4.0 or Windows 2000. For more information, refer to the *NTREADME.HLP* file included with the Compaq Support Paq The Utility Developed for Novell NetWare is provided as part of the Compaq Support Paq for Novell.

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System Power Management Guidelines

Unless the server is operating with two 1150/500-W power supplies (three for N+1 redundancy) at 220-V, it may be necessary to make trade-offs with respect to which options can be added and powered with the installed power supplies. Use the following guidelines when evaluating these trade-offs.

NOTE: The following guidelines are general. Use the Windows NT Power Supply Viewer Utility or Novell NetWare Compaq Power Subsystem Utility and option documentation to obtain the most accurate power capacity and assessment of power margin.

- Comparing processor and hard drive power: Two processors draw as much current as five to six hard drives.
- Comparing memory and 3.3-V-powered PCI expansion board power: Each additional 512 MB draws approximately as much current as one to two PCI boards.
- Comparing 5-V-powered PCI expansion board and hard drive power: One PCI card draws as much current as two to five hard drives.
- In general, PCI array controllers draw more current than PCI NICs.

For example, if the available capacity of the installed power supplies permits adding two processors, you have the option of adding:

- Two processors, or
- One processor and three hard drives, or
- Up to six hard drives

Grounding Requirements

For proper operation and safety, proper grounding of this equipment in accordance with NFPA 70-1993 (National Electric Code), Article 250, as well as any local and regional building codes, is required. All power distribution devices, branch wiring, and receptacles must be listed grounding-type devices.

Due to the higher ground-leakage currents associated with the equipment, Compaq recommends the use of a Power Distribution Unit (PDU) that provides a supplementary ground conductor. This supplementary ground conductor should be permanently connected to a suitable building ground terminal. The use of common power outlet strips for this equipment is not recommended.

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In Canada, the equipment should be installed in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries the installation should follow any regional or national electrical wiring codes such as the International Electrotechnical Commission (IEC) 364, parts 1 through 7. All power distribution devices used in the installation, including branch wiring, receptacles, and so on, should be listed or certified grounding-type devices.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Disconnect power from the server by unplugging the power cord from either the electrical outlet or the server.

When using power strips for electrical distribution, make sure that ground integrity is maintained for each connection made. Plug each component into a reliably grounded outlet.

Temperature Requirements

To ensure continued safe and reliable operation of the equipment, install/place the system in a well-ventilated, climate-controlled environment.

The Compaq Maximum Recommended Ambient Operating Temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located should not exceed 35°C (95°F).

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The operating temperature inside the rack will always be higher than the room temperature and is dependent on the configuration of equipment in your rack. The TMRA for each piece of equipment should be checked before installation. The maximum internal rack temperature for your configuration should not exceed the values shown in Table 2-2.

Table 2-2
Rack Internal Temperature Maximums

Equipment Included	Maximum Internal Rack Temperature
Rack-Mountable ProLiant servers	43°C/122°F
Compaq Rack-Mountable options	40°C/104°F
Other manufacturers' options	See other manufacturers' specifications

Note: All temperature ratings shown are for sea level. There is an altitude derating of 1.8°F per 1,000 ft to 10,000 ft (1°C per 300 m to 3,000 m).

CAUTION: To reduce the risk of damage to the equipment when installing third-party options:

- Make sure that the optional equipment does not impede airflow to the rack-mountable ProLiant servers or increase the internal rack temperature beyond the Compaq-specified maximum rating.
- Make sure that the Manufacturer's Maximum Recommended Ambient Operating Temperature of the optional equipment is not exceeded when the options are installed in the rack.

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Airflow Requirements

The Compaq ProLiant ML750 server draws cool air in through the front door and exhausts warm air out the rear door. Therefore, the front door of the rack must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be ventilated adequately to allow the warm air to escape from the cabinet. Do not block the ventilation apertures.

CAUTION: If a third-party rack is used, the following minimum requirements should be observed to ensure adequate airflow and to prevent damage to the equipment:

- Front: The rack door should have 120 square inches (305 cm^2) of holes evenly distributed from top to bottom to permit adequate airflow.
- Side: The clearance between the installed module and the side panels of the rack should be a minimum of 2.75 inches (7 cm).
- Rear: The clearance between the back of the rack and the wall should be a minimum of 30 inches (76 cm), and the equipment should be operating without a rear door.

CAUTION: If all of the vertical space in the rack is not filled by components, the gaps left will cause a change in airflow through the rack and across the components. These gaps must be covered with blanking panels.

High Airflow Rack Door Insert

The increased power of new processor technology requires increased cooling efficiency for rack-mounted servers. The new Compaq Rack 9000 series provides enhanced airflow for maximum cooling, allowing these racks to be fully loaded with servers using the latest processors.

When installing this server in Compaq Rack 7000 and 4000 series the new processor technology requires the installation of a new Compaq High Airflow Rack Door Insert, if the rack has a LEXAN front door.

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Shipping Boxes Contents

Unpack the shipping boxes by following the instructions and illustrations printed on the outside of the boxes. Locate the following materials:

- ProLiant ML750 server—located inside the shipping box
- Keyboard—located inside the keyboard box
- Mouse—located inside the country-specific kit box
- Power cords—located inside the country-specific kit box
- Padlock and two keys for the power supply security bar—located inside the country-specific kit box
- Documentation inside the server on the server access panel labels
- Hardware documentation and software packs (Server Setup and Management, Reference Information, and Software Products)—located inside the country-specific kit box

In addition to these supplied items, you may need:

- T-15 Torx screwdriver
- Options to be installed, such as expansion boards, monitors, uninterruptible power supply (UPS), power supplies, hard drives, tape drives, processors and Processor Power Modules, and/or memory
- Application software
- Cage nut fitting tool
- Phillips-head screwdriver
- Flat-head screwdriver
- Pencil

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- The Installing Rack Products CD is included with the server. You may also want to refer to the following documentation:
  - Rack Resource CD Kit (shipped with Compaq racks)

    NOTE: The Rack 7000/4000 Series Rack Resource CD Kit ships with all Compaq 7000 and 4000 Series Racks. The Rack 9000 Series Rack Resource CD Kit ships with all Compaq 9000 Series Racks.

  - Rack Builder Configuration Tool CD (the files are available on the Compaq website or the CD can be ordered with the Rack Resource CD Kit)
  - Rack Information Library CD (the files are available on the Compaq website or the CD can be ordered with the Rack Resource CD Kit)

Removing the Shipping Bracket

To protect the power supply from damage during shipment, each power supply is installed with a protective covering bracket. Figure 2-1 illustrates the procedure for removing the brackets and screws.

IMPORTANT: Save the brackets and screws in a safe location. The brackets and screws should be replaced if the server must be shipped in the future.

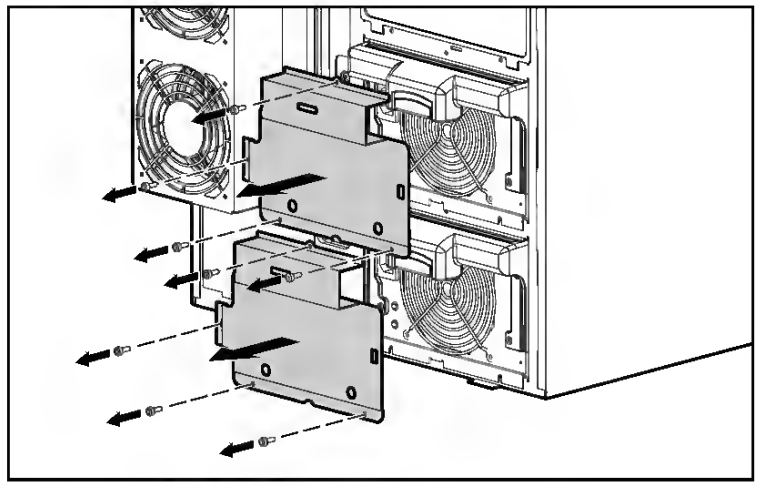

Figure 2-1. Removing the power supply shipping bracket

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Locating the Server Access Panel Labels

A significant amount of server configuration and options installation information is provided on the access panel labels. As shown in Figure 2-2, these labels are located on the inside of the top access panel, the left side access panel, and the right side access panel. To remove the appropriate panel, see Chapter 3, "Server Operation."

IMPORTANT: These labels do not contain warning and caution information. Refer to this guide or to the option documentation for the applicable warnings and cautions.

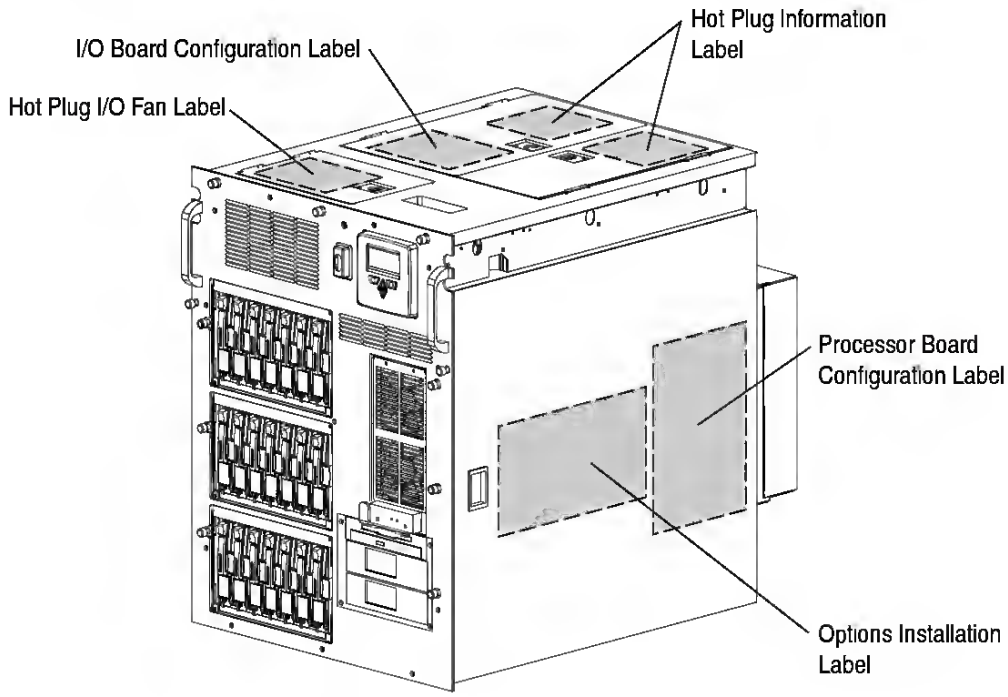
I/O Board Configuration Label
Hot Plug Information Label
Hot Plug I/O Fan Label
Processor Board Configuration Label
Options Installation Label

Figure 2-2. Location of server access panel labels

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Rack Warnings and Precautions

Before beginning these procedures, make sure you understand the following warnings:

46 - 109 kg
100 - 240 lb

WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Obtain adequate assistance to lift and stabilize the chassis during installation or removal.
- The product will be unstable when not fastened to the rails.
- Remove all hot-plug power supplies, access panels, and drives to reduce the overall weight of the product.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single rack installation.
- The racks are coupled together in multiple rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

IMPORTANT: To reduce the overall weight of the system, Compaq recommends that all power supplies, hot-plug hard drives, top access panel and both side access panels be removed from the server before loading it onto the rails.

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IMPORTANT: Refer to the Compaq Installing Rack Products CD.

You may also want to refer to the following documentation:

- Rack Resource CD Kit (shipped with Compaq racks)*
- Rack Builder Configuration Tool CD (available on the Compaq website or can be ordered with the Rack Resource CD Kit)
- Rack Information Library CD (available on the Compaq website or can be ordered with the Rack Resource CD Kit)

*The Rack 7000/4000 Series Rack Resource CD Kit ships with all Compaq 7000 and 4000 Series Racks. The Rack 9000 Series Rack Resource CD Kit ships with all Compaq 9000 Series Racks.

Server Warnings and Precautions

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded electrical outlet that is easily accessible at all times.
- Install the power supply before connecting the power cord to the power supply.
- Unplug the power cord before removing the power supply from the server.
- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.

CAUTION: Because the ProLiant ML750 server does not have safety interlocks, it is possible for a unit to be operated without the cover properly installed. This could cause thermal damage to the system and may void your warranty. The Compaq ProLiant ML750 server must always be operated with the access panels on. Proper cooling will not be achieved if the access panels are removed.

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Removing the Top Access Panel

To remove the top access panel:

1. Loosen the top two thumbscrews and the slotted Torx (middle) screw.
2. Slide the top access panel toward the rear of the unit about 1.0 inch (2.5 cm).
3. Lift and remove the top access panel.

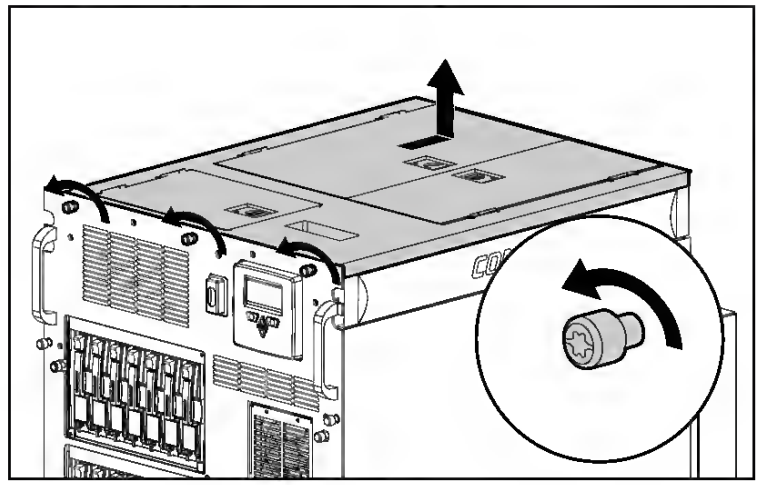

Figure 2-3. Removing the top access panel

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Removing the Slide Fillers

Two slide fillers cover the spaces on the right and left sides of the server chassis where the rack lift assists will be installed and the slides will be mounted. To remove the slide fillers:

1. Locate the slide filler tabs inside the chassis and lift up ❶.
2. Remove the slide fillers ❷.

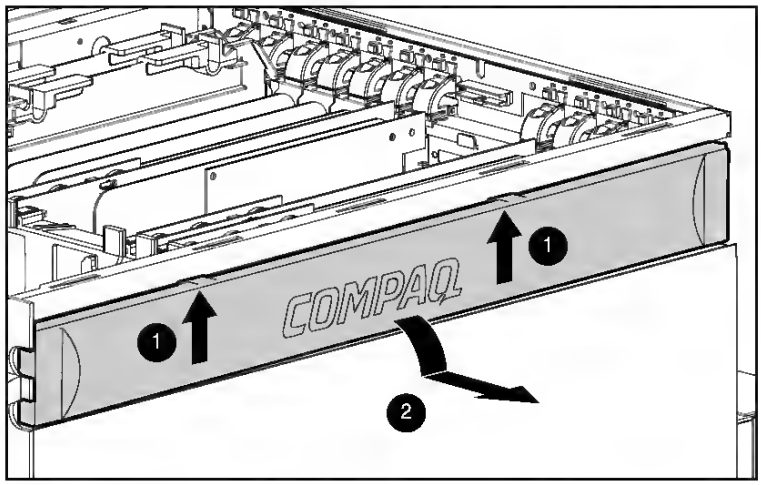

Figure 2-4. Removing the slide fillers

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Removing the Casters

1. Place the server on its left side.
2. Remove the screws that attach each caster, then remove each caster.

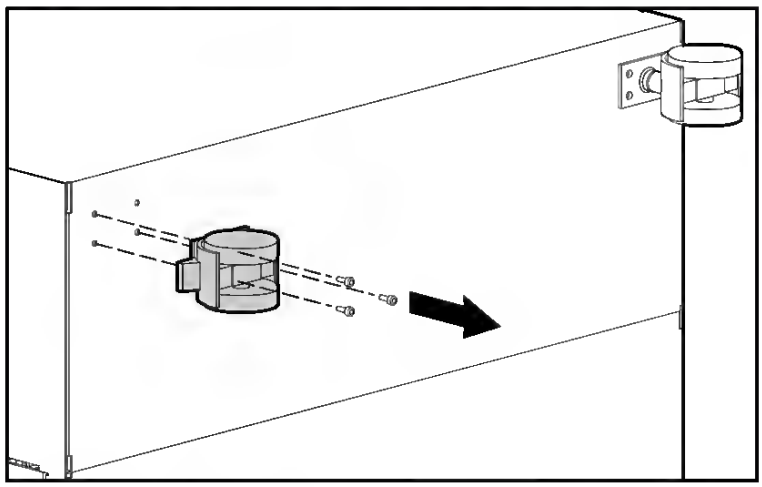

Figure 2-5. Removing the casters

3. Place the server in its upright position.

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Installing the Rack Lift Assists

1. Align the two rack lift assists with the right side of the chassis and secure each with two 6-32 self-threading screws.

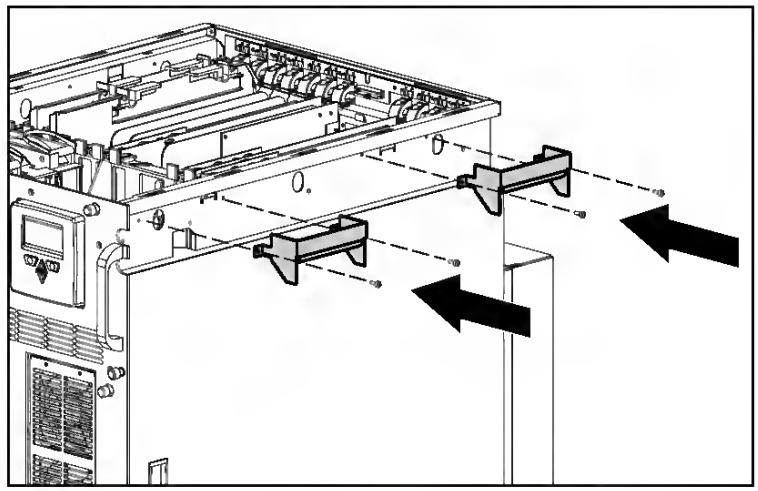

Figure 2-6. Installing the rack lift assists on the right side of the chassis

2. Repeat on the left side.

Attaching the Slide Rail Assemblies to the Rack

Attaching the slide rail assemblies to the rack consists of the following:

- Marking the server's rack position with the template
- Installing cage nuts in the back of the rack
- Installing the slide rail assemblies on the rack

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Marking the Rack with the Template

Use the paper template provided with the kit to mark the cage nut and mounting bracket positions on the rack.

1. Starting at the bottom of the rack or at the top of a previously mounted component, place the template in the desired location on the front of the rack and secure it with the two push tabs. Make sure that you match the hole pattern printed on the template with the actual holes on the rack's vertical rails.

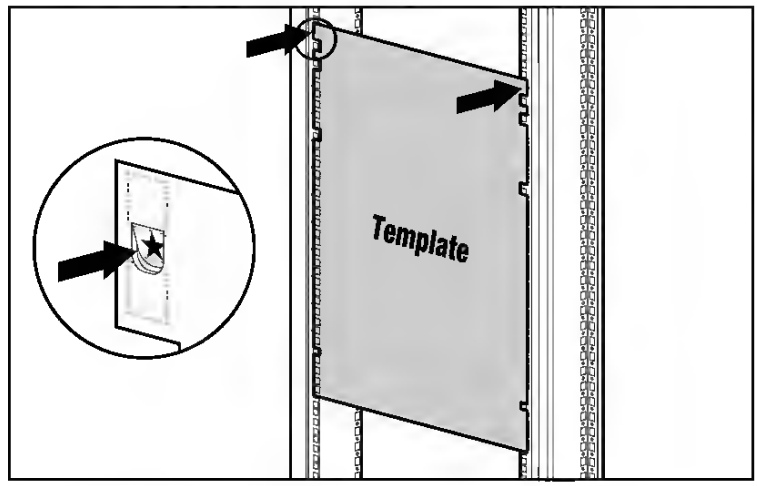

Figure 2-7. Measuring with the template

2. Use a pencil to mark the top four locations indicated on the template for the two mounting brackets. These locations are for screws, not cage nuts.

3. Use a pencil to mark the bottom four locations indicated on the template for the cage nuts that will hold the captive thumbscrews on the rack faceplate.

4. Repeat steps 1 and 2 on the back rails of the rack. On the back of the rack template, these locations are for four cage nuts. Also mark where the top of the template is on the rack. This helps align the next components.

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Inserting Cage Nuts into the Rack Frame

The cage nuts fit inside the rails at the marked locations.

1. Use the cage nut fitting tool to insert a cage nut into the rails. Squeeze the prongs together ❶ and insert the cage nut into the appropriate hole in the rack ❷.

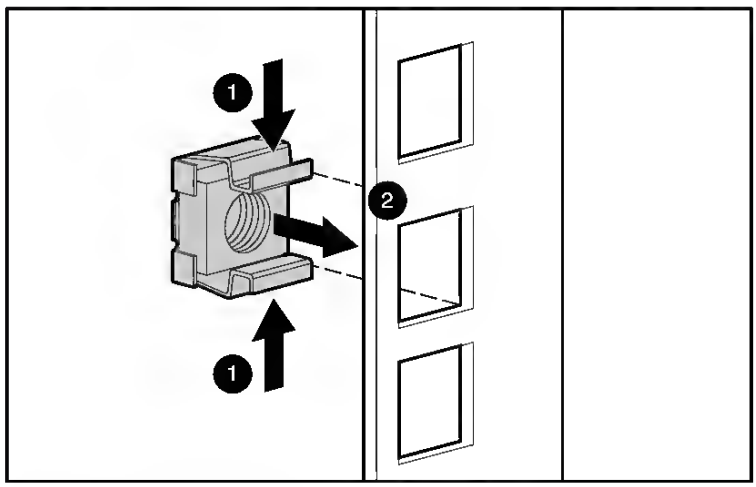

Figure 2-8. Inserting cage nuts

2. Repeat for each cage nut.

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Installing the Slide Rail Assemblies in the Rack

To install the slide rail assemblies:

1. Place a mounting bracket in position according to the pencil marks made earlier.
2. Attach the front of the bracket on the inside of the front of the rack with two M6 × 1.0-12L Phillips screws. Do not use washers.

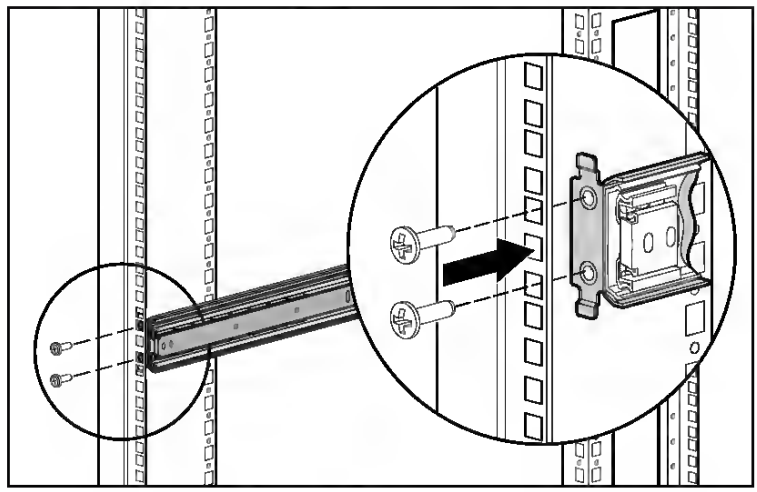

Figure 2-9. Attaching a slide rail assembly to the front of the rack

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3. Secure the back of the mounting bracket on the outside of the back of the rack with two M6 × 1.0-12L Phillips screws and cage nuts.

IMPORTANT: Make sure that the mounting bracket is level from front to back.

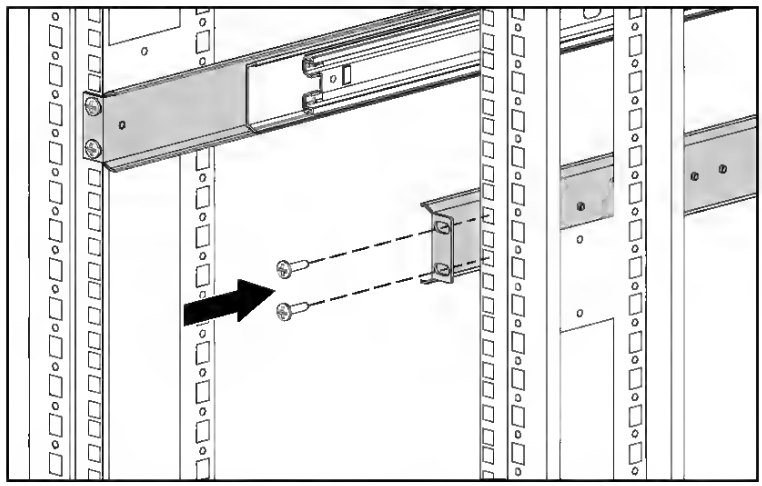

Figure 2-10. Attaching a slide rail assembly to the back of the rack

4. Repeat steps 1 through 3 for the other slide rail assembly.

Installing the Server into the Rack

46 - 109 kg
100 - 240 lb

WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local occupational health and safety requirements and guidelines for manual material handling.
- Obtain adequate assistance to lift and stabilize the chassis during installation or removal.
- The product will be unstable when not fastened to the rails.
- Remove all hot-plug power supplies, access panels, and drives to reduce the overall weight of the server.

CAUTION: If the hard drives in the server were reconfigured, make sure that the hard drives and bays are labeled to ensure hard drives are reinstalled in the same bays. Reinstalling the drives in different positions could result in the loss of data.

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IMPORTANT: To reduce the overall weight of the system, Compaq recommends that all power supplies, hot-plug hard drives, top access panel, and both side access panels be removed from the server before loading it onto the rails.

NOTE: For detailed information on removing the hot-plug hard drives and power supplies, see Chapter 4, "Installing Hardware Options."

1. Extend the slides fully.

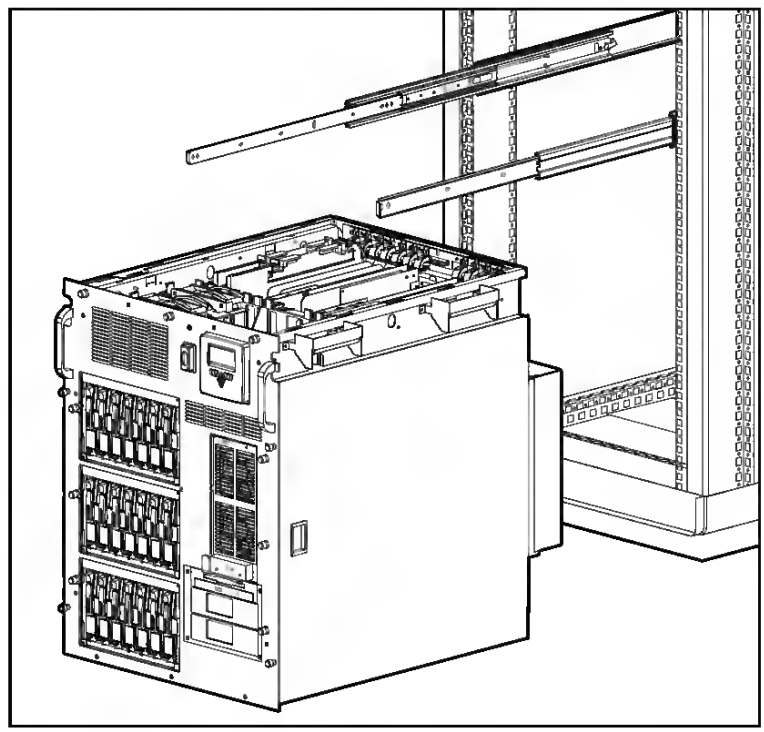

Figure 2-11. Extending the slides

2. Lift the server with the rack lift assists.

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3. Set the server on top of the extended slides.

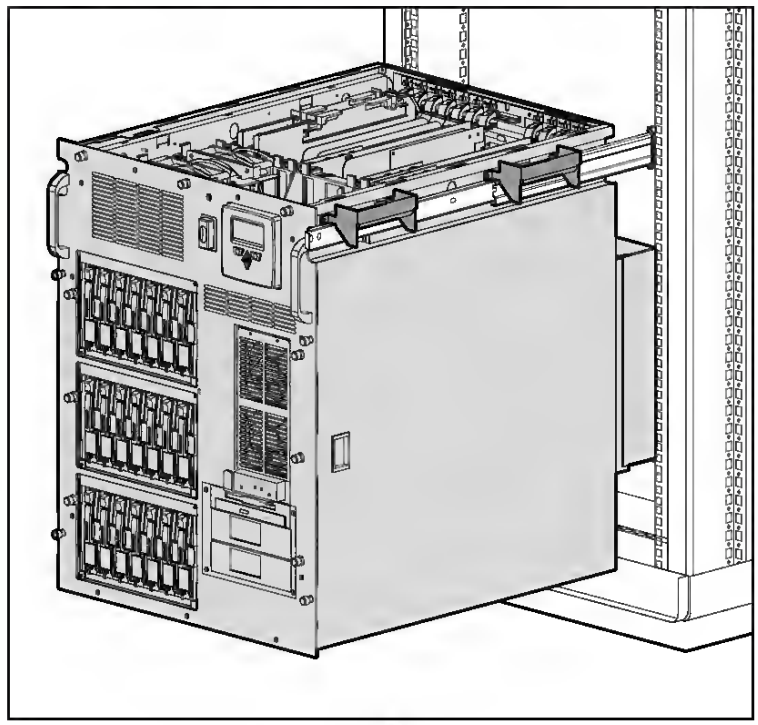

Figure 2-12. Setting the server on the slide rails

4. Slide the server between the extended slides as far as it will go.

CAUTION: Be sure to keep the server parallel to the floor when sliding the server into the slide rails. Tilting the component up or down could result in damage to the rails.

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5. Carefully align the three screw holes on each side of the server and the slide rail assembly. Attach the server to the slide rail assemblies with six 8-32 Torx head screws.

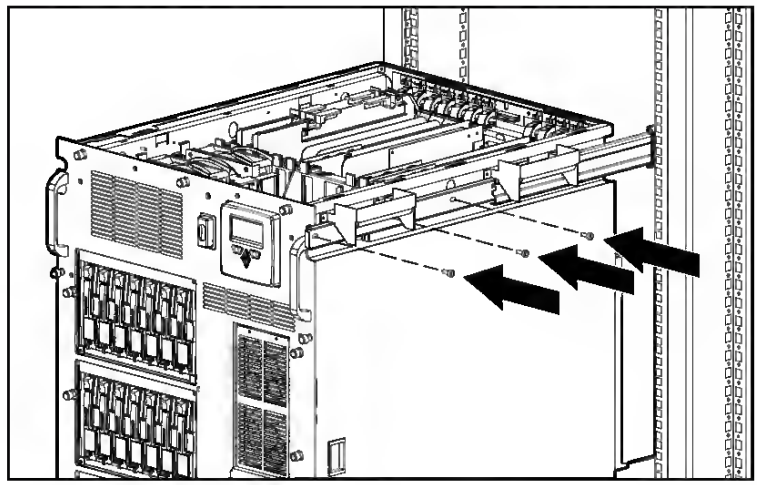

Figure 2-13. Attaching the server

6. Remove the rack lift assists. Store the rack lift assists and screws for future use if the server needs to be removed from the rack.

WARNING: To reduce the risk of personal injury, be careful when pressing the component rail release latches and sliding the component into the rack. The slide rails could pinch your fingertips.

IMPORTANT: The first time you slide the component into the rack, you may have to apply some pressure. After the first time, the ball bearings in the slide will move easily.

7. Replace the top access panel.
8. Replace any hardware that was removed for installation (hard drives, power supplies, and so on).

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Attaching the Cable Management Arm Bracket and Cable Management Arm

The cable management arm bracket and arm assembly organizes and secures the cables in the back of the server. The cable management arm attaches to the cable management arm bracket on the server and to the rack. All cables to and from the server are tied to this arm and swing out of the way when you access the server.

Installing the Cable Management Arm Bracket

The cable management arm bracket holds the cable management arm on the server.

1. Slide the server out or access it from the rear of the rack.
2. Attach the cable management arm bracket to the left side of the back of the server with two Torx-head screws.

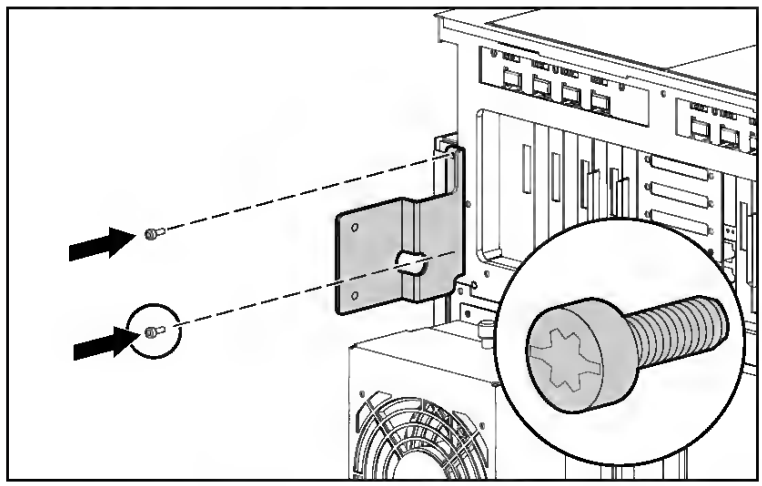

Figure 2-14. Attaching the cable management arm bracket

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Installing the Cable Management Arm

1. Slide the server into the rack.
2. Align the cable management arm.

NOTE: To align the cable management arm to the rack, place the cable management arm one hole below the rack mounting bracket.

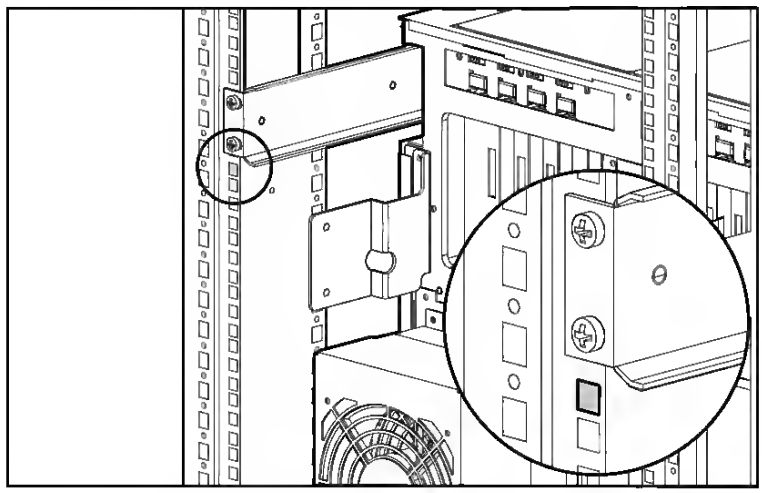

Figure 2-15. Aligning the cable management arm

3. Attach the cable management arm to the outside of the rack frame with two M6 × 1.0-12L Phillips screws.

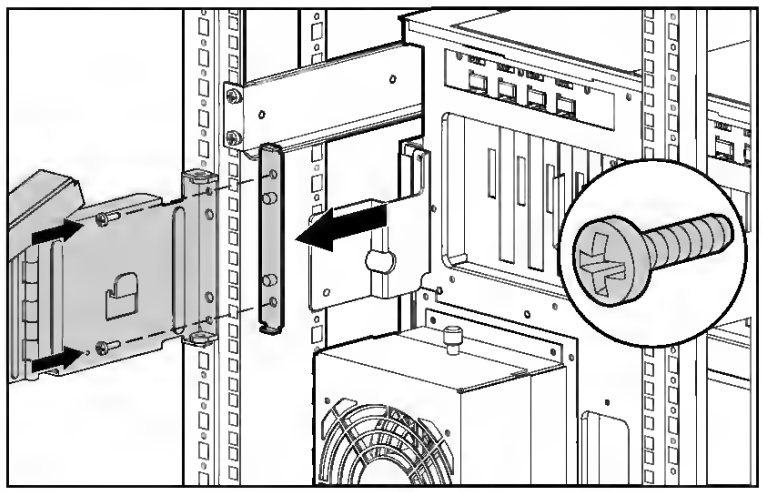

Figure 2-16. Attaching the cable management arm to the rack

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4. Attach the other end of the cable management arm to the cable management bracket using two M6 × 1.0-12L Phillips screws.

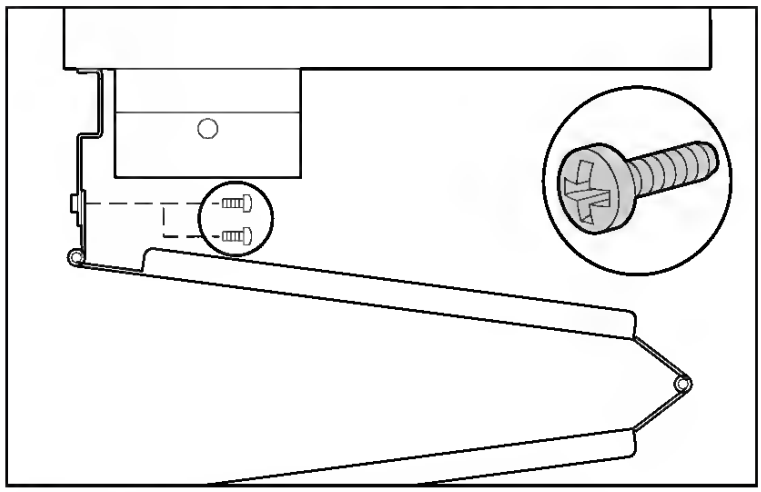

Figure 2-17. Attaching the cable management arm to its bracket

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Cabling the Server

Connect the power cords and peripheral devices such as the keyboard, mouse, and monitor. Attach the AC cord to the clip provided on the power supply to prevent the cord from being accidentally disengaged.

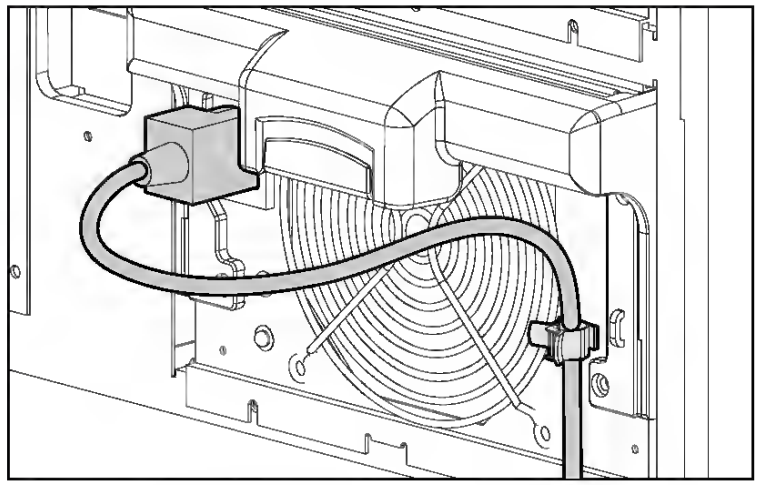

Figure 2-18. Attaching the power cord to the clip on the power supply

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Install the power supply before connecting the power cord to the power supply.
- Unplug the power cord before removing the power supply from the server.
- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

WARNING: To reduce the risk of electric shock or fire, do not plug telecommunications/telephone connectors into the Network Interface Card (NIC) receptacles.

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1. If you install a keyboard/video/mouse switch box in the rack, route the server-to-switch-box cables to the keyboard/video/mouse switch box.
2. Bundle all cables, including the power cables, and tie them to the cable management arm.

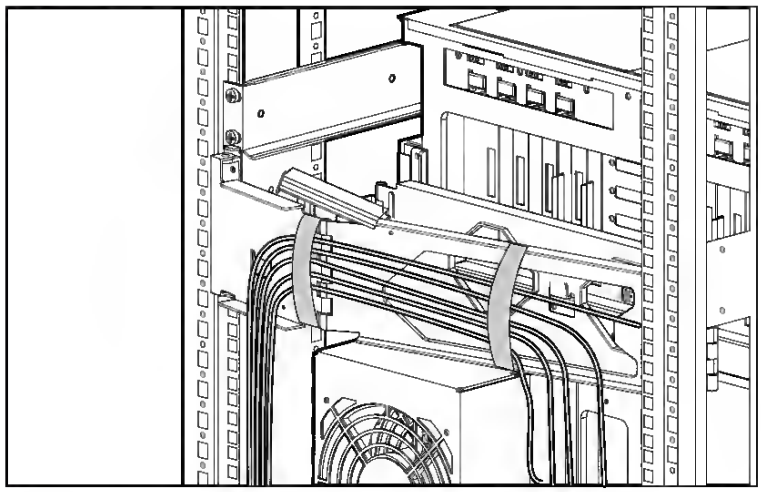

Figure 2-19. Routing and securing the cables

3. If you are going to route cables to the other side of the rack, attach the bundled cables to the cable support and join the other cables in the opposite cable channel.
4. Extend the bundled cables down through the rack's cable channel.

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Chapter 3

Server Operation

The ProLiant ML750 server provides easy access to all internal components for installation and maintenance. The information below provides details concerning system power, power supply LEDs, and removal of the server access panels.

WARNING: The power supplies in the ProLiant ML750 server produce hazardous energy levels. The installation of options and the routine maintenance and service of this product should be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

NOTE: All Compaq ProLiant servers support server management features that provide in-depth monitoring, analysis, and control of the fault-tolerance and configuration aspects of Compaq servers. Refer to the server Documentation CD for information about server management features, flash ROM, and the Compaq Insight Manager.

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System Power

The system power in the ProLiant ML750 server does not shut off completely with the front panel Power On/Standby switch. The two modes of the power switch are ON and STANDBY, rather than ON and OFF. The STANDBY position removes power from most of the electronics and the drives, but portions of the power supply, the Integrated Management Display (IMD), the system interlock circuitry and some internal circuitry remain active.

To remove all power from the system completely, you must disconnect all power cords from the server.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Disconnect power from the server by unplugging the power cord from either the electrical outlet or the server.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See Appendix B, "Electrostatic Discharge," for more information.

Powering Up the Server

You can now bring your ProLiant ML750 server online in accordance with your network and operating system procedures. When you power on the server, it should go through the following sequence. Record any discrepancies and any error messages that appear.

1. Verify that system interlocks are met. See "System Interlocks" later in the chapter.
2. Press and release the Power On/Standby switch. The front panel system LED will blink as the power supplies initialize. If the LED does not blink, there is no power to the system. When the power comes on, the LED will remain lit.

   A steady green system LED indicates that the server is powered on. If the system LED is amber, the system interlock chain is not complete. See the "System Interlocks" section later in the chapter for further instructions. If the system LED blinks once every 10-20 seconds, the system is trying to start but may have a short.

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3. Check the power supplies. The following settings indicate that the power switch is on and the power supply is in a "power on" delay mode:
   - ❑ Top LED begins flashing (green). If the top power supply LED does not begin flashing (the server will not power on), refer to the "System Interlocks" section later in the chapter.
   - ❑ Bottom LED ON (solid green).
4. When the top LED turns solid green, listen for the fans to start. Watch for the following:
   - ❑ The hard drive LEDs should blink. If the LEDs do not light, power down the server and check the cable connection to the hard drive cages. Also, check connections between the hard drive and its drive cage.
   - ❑ The green LEDs on the external fans should be on. If the LEDs do not light, there is no power to the fans. Ensure that the fan cables are properly installed at the fans, fan boards, processor board, and I/O board.

If you have an IMD, check the following. If you have a monitor, check for the steps listing monitor displays.

5. Check the IMD for messages about the:
   - ❑ Server name
   - ❑ LCD firmware
   - ❑ System initialization
   - ❑ PCI auto configuration
   - ❑ Processors
6. Check the IMD video message. If there is a monitor connected, you should see the Compaq initialization screen.
7. Check for the IMD memory test message. The monitor shows the memory count and the memory initialization.
8. Observe the memory count displayed.
9. Check for the IMD BIOS message. The monitor shows the number of processors, their speed, and their cache size.
10. Check the IMD for messages about:
    - ❑ Drive arrays
    - ❑ Diskette drive

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- Options ROM
- SCSI devices

Make sure each green LED on the PCI Hot Plug Interface Board is on (both inside and outside). To verify the inside LEDs, open the PCI Hot Plug access doors. See "Server Access Panels" later in this chapter for the location of the doors. If any LEDs are not on, power down the server. Verify the following:

- Each slot has an expansion board or a slot cover.
- All slot release levers are closed.
- The expansion boards are properly seated. If necessary, try removing and reseating the boards to make sure.
- The PCI Hot Plug Interface Board cables are properly connected to the I/O board.
- The PCI Hot Plug Interface Board is properly seated on the chassis rear I/O panel and the pushpins are pushed in.

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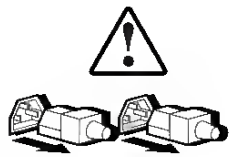
Powering Down the Server

The system power in the ProLiant ML750 server does not shut off completely with the front panel Power On/Standby switch. The two power states of the switch function as ON and Standby, rather than ON and OFF. The Standby power state removes power from most of the electronics and the drives, but portions of the power supply, the Integrated Management Display (IMD), the system interlock circuitry, and some internal circuitry remain active. To completely remove all power from the system, disconnect all power cords from the server.



WARNING: To reduce the risk of electric shock or damage to the equipment, disconnect power from the server by unplugging all power cords from either the electrical outlet or the server.

To completely remove power from the server:

1. Press the Power On/Standby switch to Standby. This disables the server's main power supply output and provides auxiliary power (+ 5V) to the server. Standby does not disable main AC power.
2. Verify that the system LED on the front panel, located near the Power On/Standby switch, goes dark and fan noise abates.
3. Disconnect all power cords from the server to disable all power to the server.

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Power Supply LEDs

Each power supply has status and AC power LEDs. See Figure 3-1 and Table 3-1 for a detailed description of both LEDs.

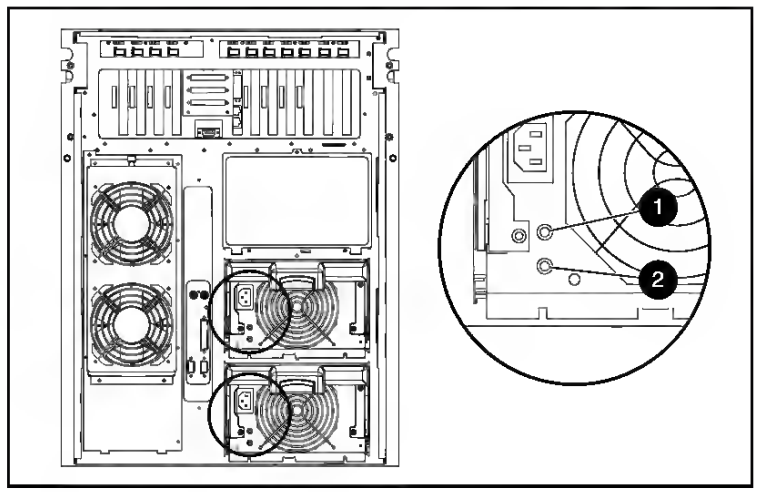

Figure 3-1. Power supply LEDs

Table 3-1
Power Supply LEDs

LED	Condition	Meaning
❶ Status ⚠	Green	Normal operation
	Green/Amber alternating	Power supply failed to restart after a prolonged fault
	Green flashing	Power supply will restart within 20 seconds
	Amber	Fault detected in this power supply
	Amber flashing	Failed self-test
	Off	System is in Standby or interlocks are disabled
❷ AC Power ☼	Green	AC power is connected to this power supply
	Off	AC power is not connected to this power supply

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Numbering of Power Supplies

The ProLiant ML750 server can be configured with up to three hot-plug redundant power supplies. See Chapter 4, "Installing Hardware Options," or the option documentation to install additional power supplies.

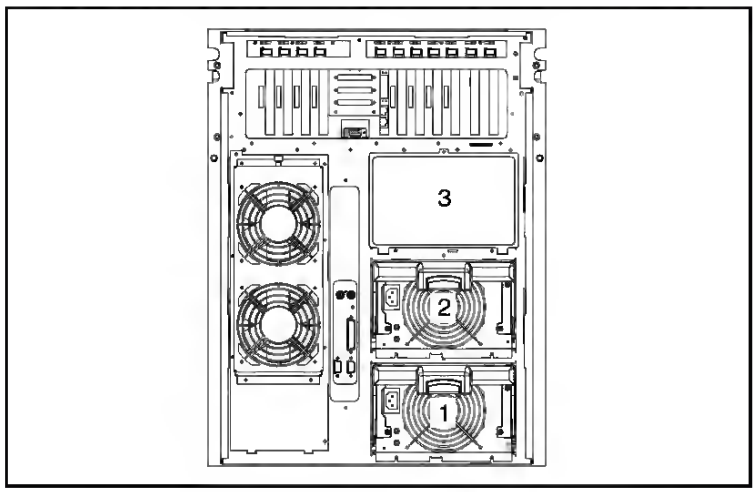

Figure 3-2. Numbering of power supplies

CAUTION: To prevent loss of data or damage to the equipment, any power supply bay that is not populated with a power supply must be covered with a blanking panel. This will ensure adequate airflow inside the server for cooling the hard drive.

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System Interlocks

The system interlocks in your ProLiant ML750 server provide a closed-loop checking mechanism for verifying proper component mating and cabling interconnects between critical server components. The system LED on the front panel of the server turns amber to indicate that the interlock chain has been broken.

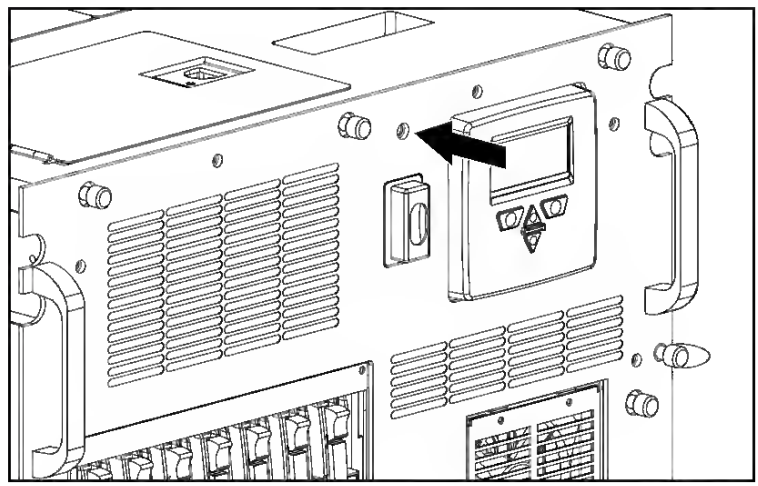

Figure 3-3. System LED

Three LEDs on the I/O board provide visual assistance in isolating components to check if the server will not power up due to a broken interlock chain. The I/O board is located directly beneath the PCI Hot Plug access doors under the top access panel.

IMPORTANT: To check system interlock LEDs, place the server in Standby with the power supplies plugged in.

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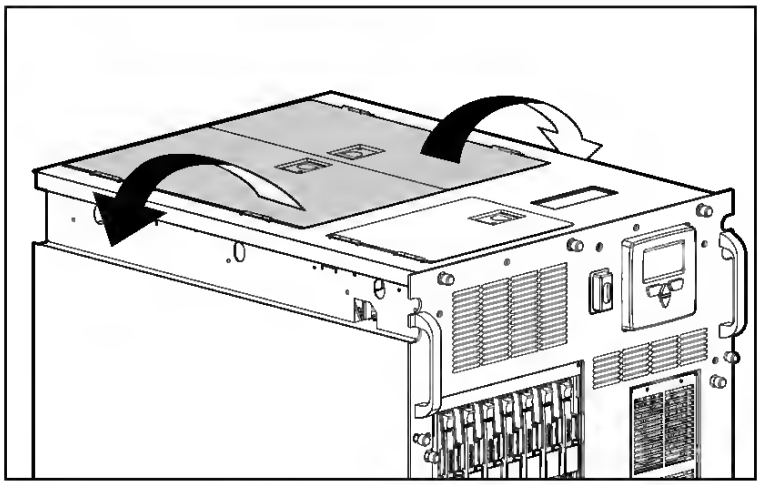

Figure 3-4. Location of I/O board under PCI Hot Plug access doors

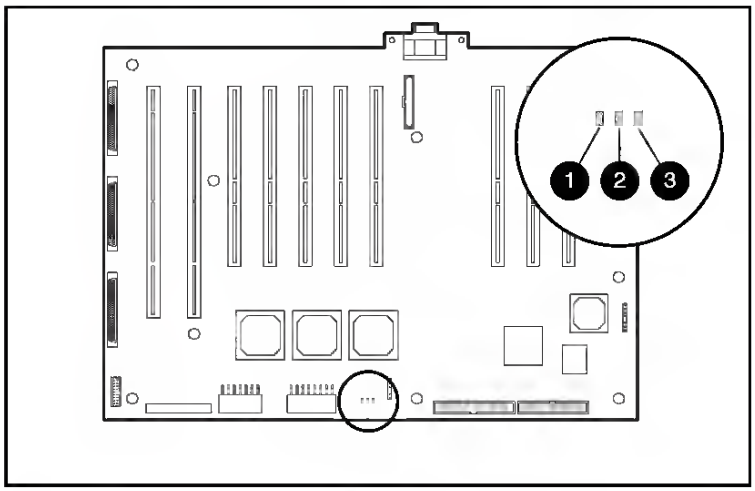

Figure 3-5. System interlock LEDs on the I/O board

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Table 3-2
System Interlock LED Status

❶ Aux 5V LED	❷ Power Fail LED	❸ System Interlock LED	Possible Affected Components to Check
ON	OFF	OFF	None (all normal) OR If the server will not power up: 1. Reinsert the power supply 2. Place the ON/Standby switch to ON 3. Verify the Power Supply Status LED blinks green for 10-20 seconds and then is solid green when the server powers on
ON	OFF	ON	Power cables I/O to Processor Board connection Processor Board components (see Table 3-3)
ON	ON	OFF	Processor Power Modules Power supplies Power cables

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If the System Interlock LED is lit, locate the 11 LEDs on the Processor Board ❶.

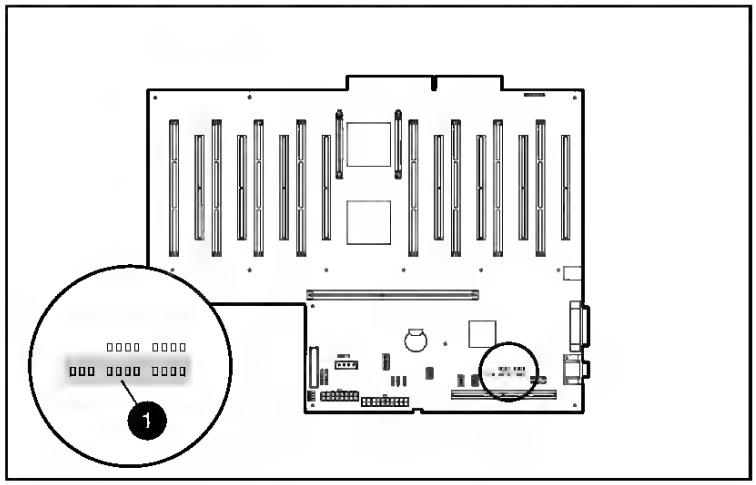

Figure 3-6. Processor board LEDs

Count the number of LEDs lit on the processor board and refer to Table 3-3 to determine possible failure points. For more details, see the "Troubleshooting Interlock Connections in the Processor Area" section later in this chapter.

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Table 3-3
Processor Board Interlock LED Status

Number of LEDs Lit	Failure Point
0	Processor Board connection Power cables in I/O area
1	Removable Media Bay
2	Memory Board
3	Cables from the I/O or Processor Board to the Power Supply Backplane (including the ribbon cable)
4	Processor Slot 8
5	Processor Slot 7
6	Processor Slot 6
7	Processor Slot 5
8	Processor Slot 4
9	Processor Slot 3
10	Processor Slot 2
11	Processor Slot 1

Troubleshooting Interlock Power

IMPORTANT: This section assumes the power supply AC power LED is green.

1. Open the PCI Hot Plug access doors.
2. Make sure the power ribbon cable is correctly aligned and completely plugged in at the I/O board and the power backplane.
3. Check the Aux 5V LED.
4. If the Aux 5V LED is still not on, replace the power supply.
5. Recheck the Aux 5V LED.
6. If the Aux 5V LED is still not on, contact Compaq or your service provider. The problem could be the backplane, a burned-out LED, or a broken ribbon cable.

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Troubleshooting Interlock Connections in the I/O Area

1. Open the access doors in the top access panel and check the System Interlock LED.
2. Place the server in Standby and disconnect all power cords from the power supplies or wall receptacles.
3. Remove the top access panel.
4. Make sure the power switcb cable is not damaged.
5. Make sure the power switch cable is properly connected to the I/O board.
6. Replace the top access panel and reconnect all power cords.
7. Power on the server and check the LEDs or the symptom again.
8. If the problem is not resolved, contact Compaq or your service provider.

Troubleshooting Interlock Connection in the Processor Area

If any of the Processor Board Interlock LEDs (as shown in Table 3-3) are lit, use these steps to troubleshoot interlock connection problems.

1. Place the server in Standby mode and disconnect all power cords from the power supplies or wall receptacles.
2. Remove the top and left access panels.
3. Reseat all processors and processor terminator boards.
4. Reseat the memory expansion board.
5. Reinstall the memory expansion board retention bracket.
6. Verify that the air sensor/interlock cable is not damaged and is properly installed on the processor board.
7. Verify that the 3V and 5V/12V power cables are not damaged and are properly connected to the processor board and power backplane.
8. Verify that the processor board and I/O board are properly mated (there should be no gold fingers visible near the top of the processor board).
9. Verify that both processor buses have all slots filled with either a processor or processor terminator board.

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10. Replace the access panels and reconnect all power cords.
11. Power on the server and check the LEDs or the symptom again.
12. If the problem is not resolved, contact Compaq or your service provider.

Running System Diagnostics

1. Make sure there is good facility power applied to the server.
2. With the server in Standby, check the LEDs on the power supplies:
   - The top LED should be OFF (clear).
   - The bottom LED should be ON (solid green).
3. Turn on the power to the machine. During the Power-On Self-Test (POST), press **F10** to start the Compaq System Diagnostics.
4. At the Main Menu, select Diagnostics and Utilities.
5. At the Diagnostics and Utilities menu, select Test Computer.
6. Select a test:
   - Quick Check runs a set of tests. The time required for the tests depends on the server configuration; it could require up to two hours. Quick Check does require less time than the Automatic Diagnostics.
   - Automatic Diagnostics runs a complete set of system tests. These tests could require several hours.

If errors occur, refer to the "Diagnostics Tools" chapter of the *Compaq Servers Troubleshooting Guide*.

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Server Access Panels

The ProLiant ML750 server chassis is designed to facilitate the installation of hardware upgrades. See Figure 3-7 to locate the access panels.

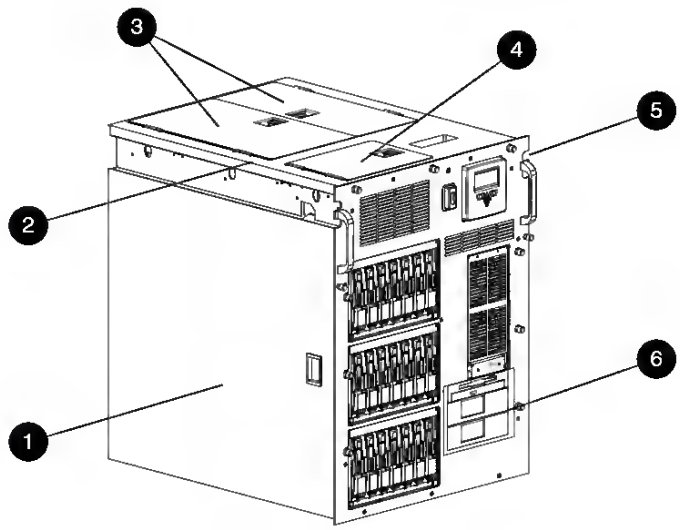

Figure 3-7. Location of access panels

Use Table 3-4 to determine how to access the server components.

Table 3-4
Quick Reference List for Accessing Server Components

To Gain Access To:	You Will Need To:
Cache Accelerators	Remove right side access panel ❺
Configuration switch settings	Remove right side access panel ❺
Front Internal Processor Fan (Fan 4)	Remove Hot-Plug Processor Fan 3 from front of server chassis
Hard drive cages	Remove left side access panel ❶
Hot-Plug Redundant I/O Fans (Fans 1 and 2)	Open Hot-Plug I/O Fan access door ❹
I/O board	Remove top access panel ❷

continued

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Table 3-4
Quick Reference List for Accessing Server Components *continued*

To Gain Access To:	You Will Need To:
Memory (DIMMs)	Remove right side access panel and memory expansion board ❺
PCI Hot Plug expansion slots	Open PCI Hot Plug access doors ❸
Processor bus/core ratio switch	Remove right side access panel ❺
Processor Power Modules and Processor Board Power Module	Remove right side access panel ❺
Processor sockets	Remove right side access panel ❺
Rear Internal Processor Fan (Fan 5)	Remove Hot-Plug Processor Fan 6 from rear of server chassis
Removable media bays	Remove removable media frame and right side access panel ❻ ❺

The following sections provide instructions for removing the top access panel, the right side access panel, and the left side access panel. For information pertaining to PCI Hot Plug and hot-plug I/O fan access, see Chapter 4, "Installing Hardware Options."

WARNING: To reduce the risk of personal injury, disconnect all power cords and unplug any telecommunications cables before removing any access panels.

- Disconnect the power cord to avoid exposure to hazardous energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry.
- Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

CAUTION: Never operate the server with an access panel removed or partially installed. Doing so could cause thermal damage to the hard drives or system and could void your server warranty.

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Removing the Top Access Panel

To remove the top access panel:

1. If the server is on, place the server in Standby mode and disconnect the power cords. See "Powering Down the Server" earlier in the chapter.
2. Loosen the top two thumbscrews and slotted Torx (middle) screw.
3. Using the top access handle, slide the top access panel toward the rear of the unit about 1.0 inch (2.5 cm).

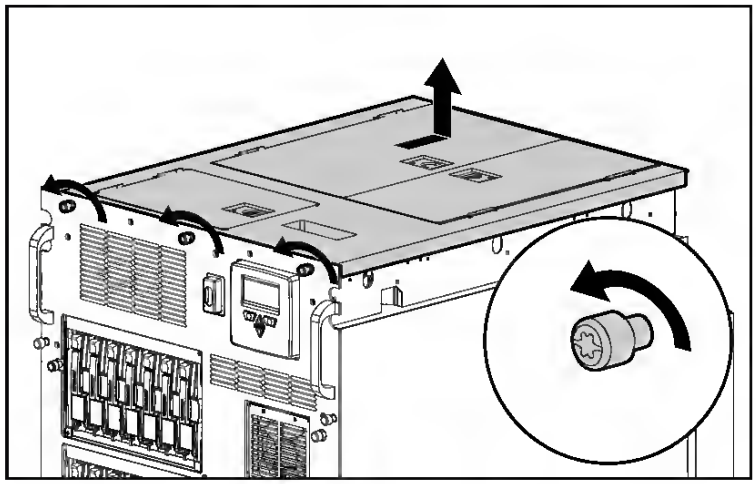

Figure 3-8. Removing the top access panel

4. To locate the I/O board, the PCI Hot Plug expansion slots, and I/O Fans 1 and 2, lift and remove the panel.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Never operate the server with an access panel removed or partially installed. Doing so will cause thermal damage to the system and could void your warranty.

5. Turn the top access panel over to locate the access panel labels.

NOTE: These top access panel labels provide instructions for installing expansion boards and hot-plug fans, as well as information on PCI Hot Plug.

6. To reassemble the server, reverse steps 1 through 4.

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Removing the Right Side Access Panel

To remove the right side access panel:

1. If the server is on, place the server in Standby mode and disconnect the power cords. See "Powering Down the Server" earlier in the chapter.
2. Loosen the two thumbscrews and the slotted Torx (middle) screw located on the right side of the chassis.
3. Slide the right side access panel toward the rear of the unit 1.0 inch (2.5 cm).

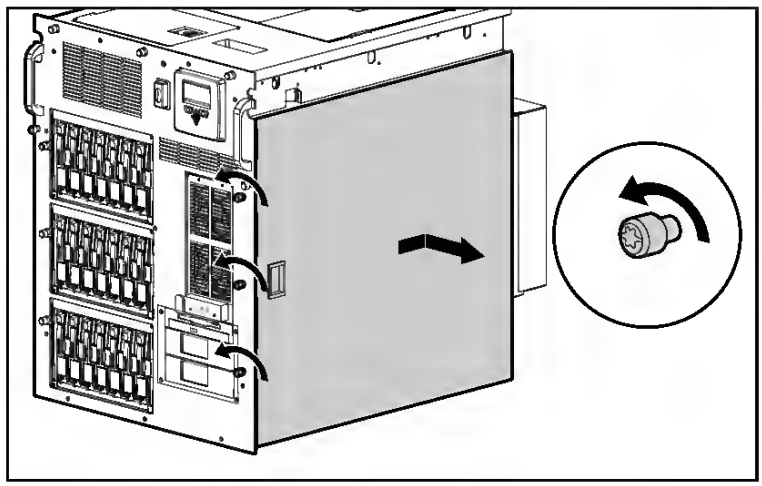

Figure 3-9. Removing the right side access panel

4. To locate the processor board, the Cache Accelerators, bus/core ratio switches, and the memory expansion board, remove the right side access panel.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Never operate the server with an access panel removed or partially installed. Doing so will cause thermal damage to the system and could void your warranty.

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5. Turn the right side access panel over to locate the processor board configuration label.

   NOTE: The side access panel labels provide instructions for setting switches and installing processors, DIMMs, Processor Power Modules, and fans.

6. To reassemble the server, reverse steps 1 through 4.

Removing the Left Side Access Panel

To remove the left side access panel:

1. If the server is on, place it in Standby mode and disconnect the power cords. See "Powering Down the Server" earlier in the chapter.
2. Loosen the two thumbscrews and the slotted Torx (middle) screw located on the left side of the chassis.
3. Slide the left side access panel toward the rear of the unit 1.0 inch (2.5 cm).

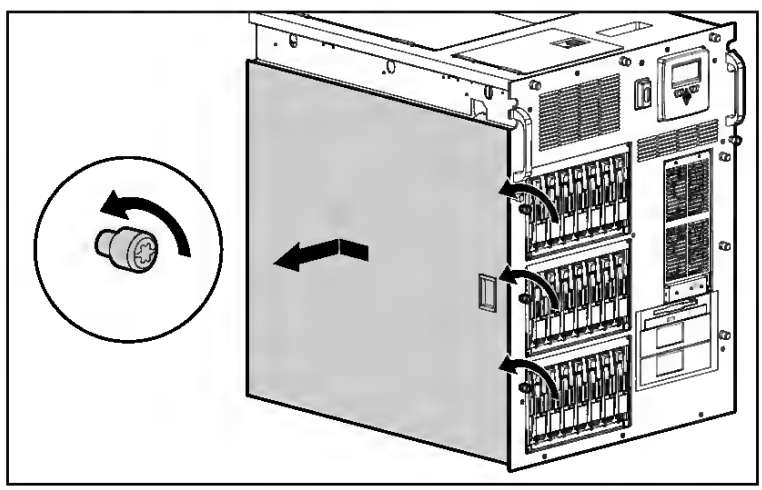

Figure 3-10. Removing the left side access panel

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4. To locate the hard drive and power supply backplane, remove the left side access panel.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Never operate the server with an access panel removed or partially installed. Doing so will cause thermal damage to the system and could void your warranty.

To reassemble the server, reverse steps 1 through 4.

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Chapter 4

Installing Hardware Options

This chapter contains detailed procedures for installing hardware option upgrades. Refer to the Quick Installation poster shipped with your server or to the labels attached to the inside of the server access panels for additional information.

WARNING: To reduce the risk of personal injury or damage to the equipment, comply with all warnings and cautions throughout the installation instructions.

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power supplies and hot-plug hard drives should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See Appendix B, "Electrostatic Discharge," for more information.

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Installing a Hot-Plug Power Supply

The ProLiant ML750 server is capable of supporting up to three power supplies. The system power in the ProLiant ML750 server does not have to be shut off to install additional hot-plug power supplies.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Install the power supply before connecting the power cord to the power supply.
- Unplug the power cord before removing the power supply from the server.

NOTE: The power supplies may not be redundant on your server if the power required by the options exceeds the power supplied by the remaining power supplies. For more information, see "Power Requirements" in Chapter 2.

To install a new hot-plug power supply with the system power on:

1. Unlock and remove the power supply security bar by lifting the locking latch ❶, pivoting the security bar away from the server ❷, and lifting the security bar out of the toe slot ❸.

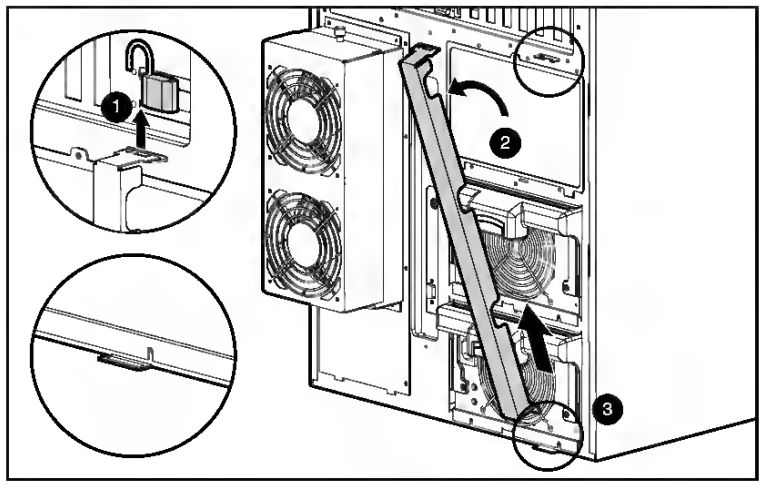

Figure 4-1. Removing the power supply security bar

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2. From the rear of the server, locate and remove the blanking panel from the available power supply cage by removing the retaining screw ❶ and lifting the blanking panel from its position ❷.

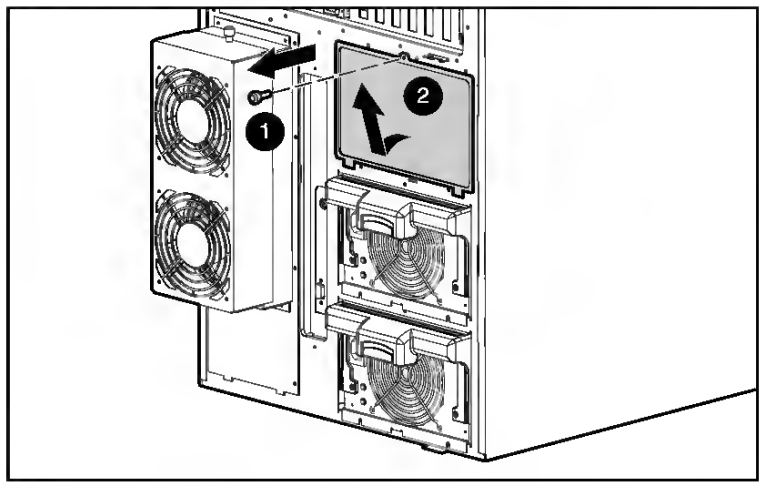

Figure 4-2. Removing the power supply cage blanking panel

CAUTION: Do not leave the blanking panel off for prolonged periods if no power supply is installed. System airflow could be adversely affected and result in hard drive overheating.

3. Remove the protective cover from the new power supply connector. Keep the cover for future handling.
4. Lower the handle on the new hot-plug power supply.

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5. Slide the hot-plug power supply into the power supply cage until seated securely ❶.
6. Raise the handle to lock the power supply into place ❷. The power supply fan will start immediately if the system is running.

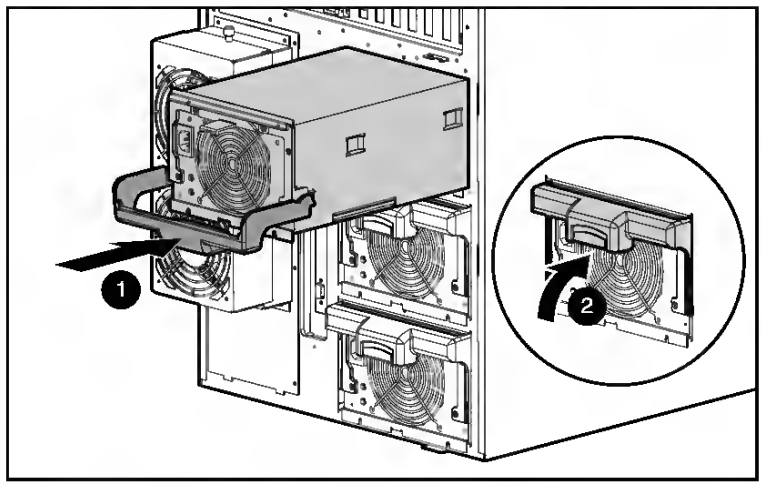

Figure 4-3. Securing the hot-plug power supply

7. Plug in the power cord.
8. (Optional) Using the tie wrap provided, fasten the power cord to the plastic loop provided on the power supply. Leave an 8-inch (20.32 cm) service loop for the plug. This will prevent the plug from becoming disengaged accidentally.

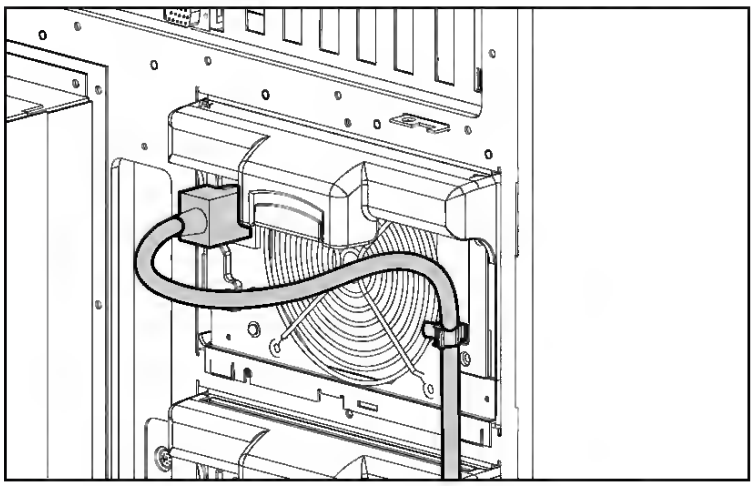

Figure 4-4. Securing the power cord to the plastic clip

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9. Verify that the power supply status LED is green. If installation is performed with the system power on, the power supply LEDs should activate immediately.
10. For a detailed description of the power supply LEDs, see the "Power Supply LEDs" section in Chapter 3.

Installing a Pentium III Xeon Processor and Redundant Processor Power Module

The ProLiant ML750 server is capable of supporting up to eight processors and Processor Power Modules. An additional processor board Processor Power Module is installed to power the processor board.

CAUTION: Handle the processor only by the ejectors and, only if necessary, lay the processor on its back (the plastic side with the hologram) to prevent damage to the heat pipes and fins.

CAUTION: The redundant Processor Power Module must be installed before the corresponding processor. Attempting to install the Processor Power Module after the processor has been installed could damage the Processor Power Module.

IMPORTANT: For best performance, install the first four processors in Processor Slots 1 through 4. Cache Accelerators must be used if processors are installed on both buses.

Operating the server with processors installed in both buses but without the Cache Accelerators will prevent the system from booting and cause an error message to be displayed. See the "Installing Cache Accelerators" section later in this chapter for more information.

NOTE: Be sure to keep processor terminator boards as processors are added. The processor terminator boards can be used in the event of a processor failure so that the server will run with the remaining processors.

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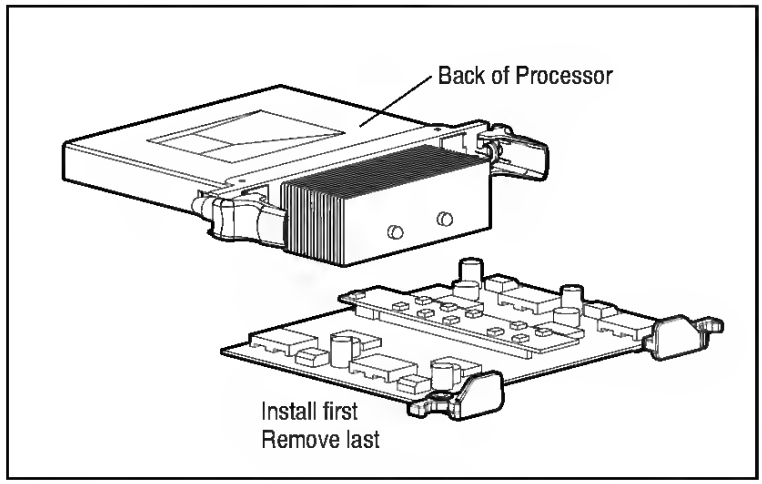

Figure 4-5. Pentium III Xeon processor and redundant Processor Power Module

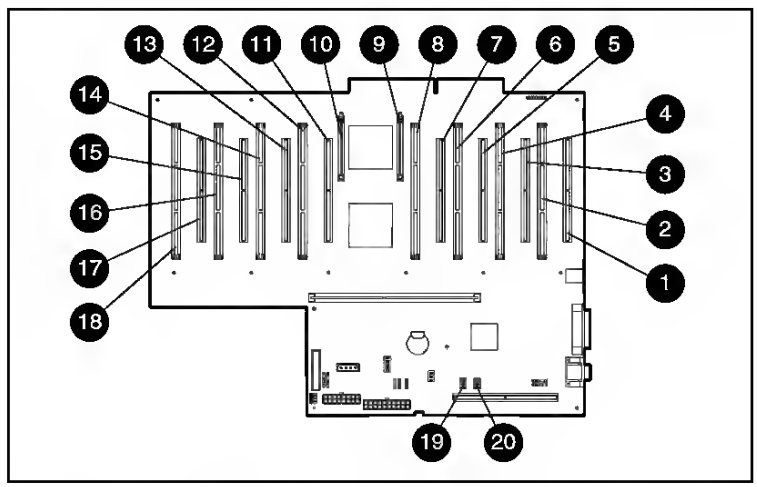

Figure 4-6. Processor board layout

NOTE: The default setting of the bus/core ratio switches (all switches OFF) allows the ROM to automatically set the optimal speed for the processor buses. Compaq recommends that the bus/core switches remain in the default position.

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Table 4-1
Processor/Processor Power Module Slots and Bus/Core Ratio Switch Locations

Item	Component	Item	Component
❶	Processor Power Module Slot 1	⓫	Processor Power Module Slot 5
❷	Processor Slot 1	⓬	Processor Slot 5
❸	Processor Power Module Slot 2	⓭	Processor Power Module Slot 6
❹	Processor Slot 2	⓮	Processor Slot 6
❺	Processor Power Module Slot 3	⓯	Processor Power Module Slot 7
❻	Processor Slot 3	⓰	Processor Slot 7
❼	Processor Power Module Slot 4	⓱	Processor Power Module Slot 8
❽	Processor Slot 4	⓲	Processor Slot 8
❾	Cache Accelerator Slot 1	⓳	Processor Bus 2 Bus/Core Ratio Switch
❿	Cache Accelerator Slot 2	⓴	Processor Bus 1 Bus/Core Ratio Switch

When installing new processors, it is important to follow these guidelines:

- All processors must be Intel Pentium III Xeon processors. The ProLiant ML750 server does not support Pentium II Xeon processors.
- Processors must be installed starting from the slot closest to the rear of the server (Slot 1).
- Each pair of processor slots must contain processors of the same cache size (processor slot pairs are: Slots 1 and 2, Slots 3 and 4, Slots 5 and 6, Slots 7 and 8). If there is no match for a processor, the second slot in the pair must be filled with a processor terminator board.
- The processor pair with the lowest cache size should be installed closest to the rear of the server. If a second pair of processors has a larger cache size, it should be installed in the next pair of slots.

CAUTION: The server will not boot if the Intel Pentium III Xeon processors are not the same speed.

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Figure 4-7 shows the processor slots in the server.

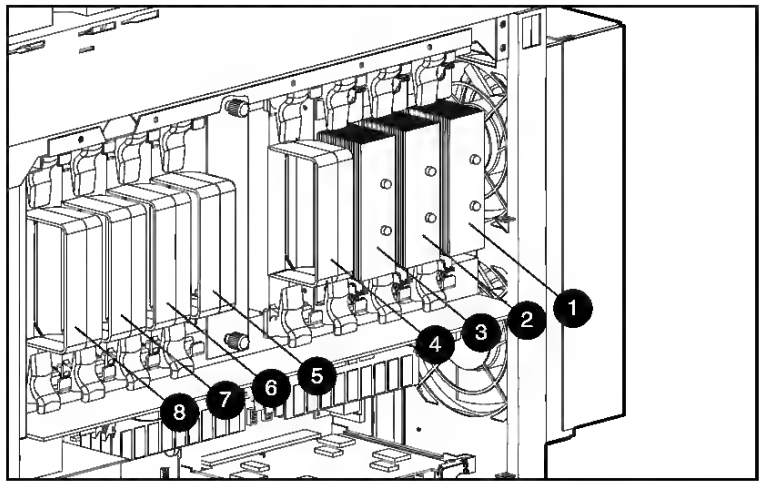

Figure 4-7. Processor slots in the server (slots 1 through 3 shown populated)

The table below shows examples of processors installed using these guidelines.

Table 4-2
Examples of Processor Mixing by Cache Size

Examples	Processors in Slots 1 and 2	Processors in Slots 3 and 4	Processors in Slots 5 and 6	Processors in Slots 7 and 8
Example 1	1M	1M	1M	2M
	1M	1M	Terminator Board	2M
Example 2	1M	2M	2M	Terminator Board
	1M	2M	Terminator Board	Terminator Board

With the bus/core ratio switches in the default position, the system ROM will automatically detect the speed of processors installed on both processor buses. The processors will automatically run at the speed of the slowest processor installed in the server.

The default setting for the bus/core ratio switches is all switches OFF. Compaq recommends that the bus/core ratio switches remain on the default setting to allow the system ROM to automatically detect the correct speed.

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CAUTION: The server may not boot if the bus/core ratio switches are set to a speed higher than the slowest processor. Failure to properly set the bus/core ratio switches could cause damage to the server and could void your warranty.

Compaq recommends that the bus/core ratio switches remain in the default position (all switches OFF).

To install a redundant Processor Power Module and a processor in the processor board, refer to one of the following installation sources:

- For a text and illustrated procedure, refer to the documentation provided with the option kit.
- For an illustrated overview of the procedure, refer to the Compaq ProLiant ML750 quick installation poster included in the shipping box or to the processor board label located on the inside of the side access panel.
- For processor installation, see the procedure below.

1. If the server is on, place the server in Standby and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. Remove the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

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3. Pivot the main processor air baffle out at the rear ❶ and remove from the chassis ❷.

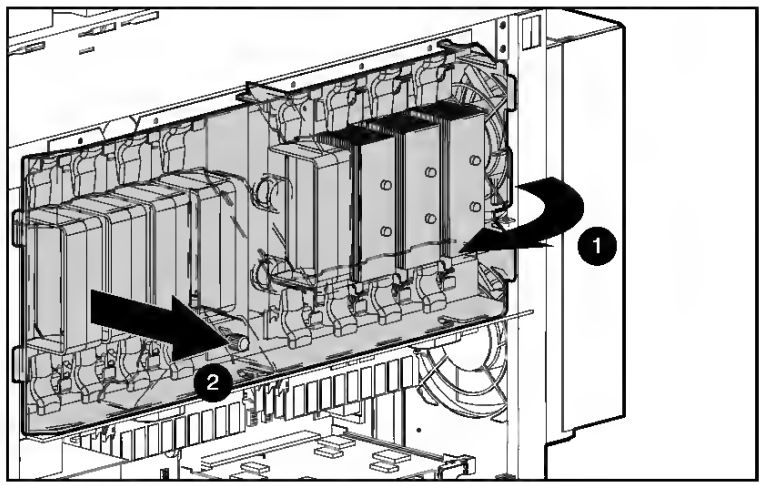

Figure 4-8. Removing the main processor air baffle

4. Locate the next available processor socket and corresponding Processor Power Module socket on the processor board. Available sockets in a processor bus will have a processor terminator board installed.

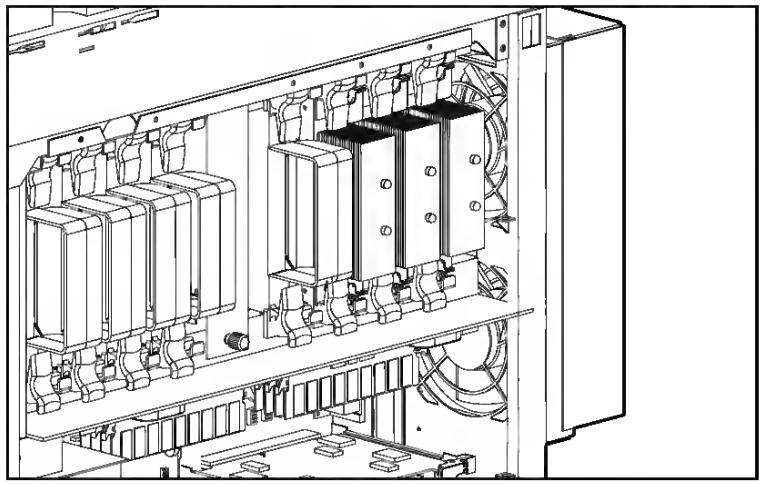

Figure 4-9. Three processors installed in Slots 1, 2, and 3 (4 through 8 shown available)

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5. Open the ejector levers ❶ on the processor terminator board and remove it by pulling it out by the handle ❷. Retain the processor terminator board for future use.

NOTE: If you remove a processor, another processor or a processor terminator board must be installed before powering up the server.

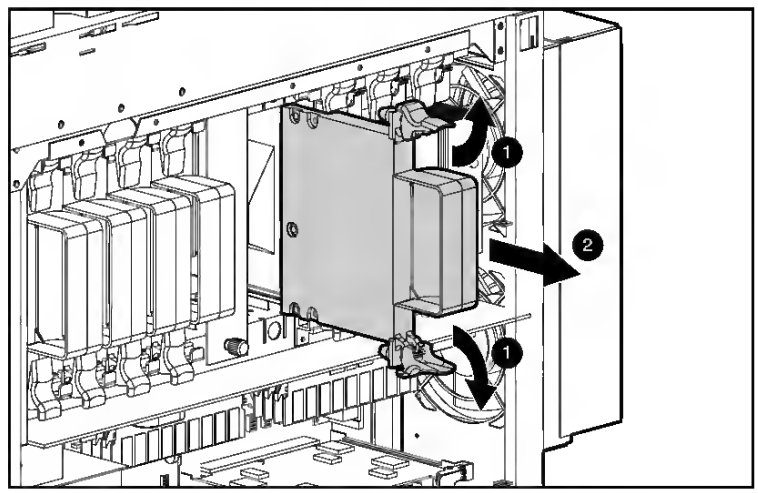

Figure 4-10. Removing the processor terminator board

6. Locate the processor bus/core ratio switches for the processor buses. See the beginning of this section or the right side access panel label for details.

7. Check the processor bus/core ratio switches of both processor buses to ensure the switches are in the default position (all switches OFF).

CAUTION: The server may not boot if the bus/core ratio switches are set to a speed higher than the slowest processor. Failure to properly set the bus/core ratio switches could cause damage to the server and could void your warranty.

Compaq recommends that the bus/core ratio switches remain in the default position (all switches OFF).

NOTE: The processor and redundant Processor Power Modules are keyed to ensure correct alignment.

8. Align the new redundant Processor Power Module, components pointing toward the front of the server, with the Processor Power Module slot. Install and secure the Processor Power Module by pushing it into the slot ❶ and simultaneously rotating the ejector levers inward ❷. If the Processor Power Module is installed correctly, you will hear the ejectors click into the locked position.

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CAUTION: The redundant Processor Power Module must be installed before the accompanying processor. Attempting to install the Processor Power Module after the processor has been installed could damage the electronic components on the Processor Power Module.

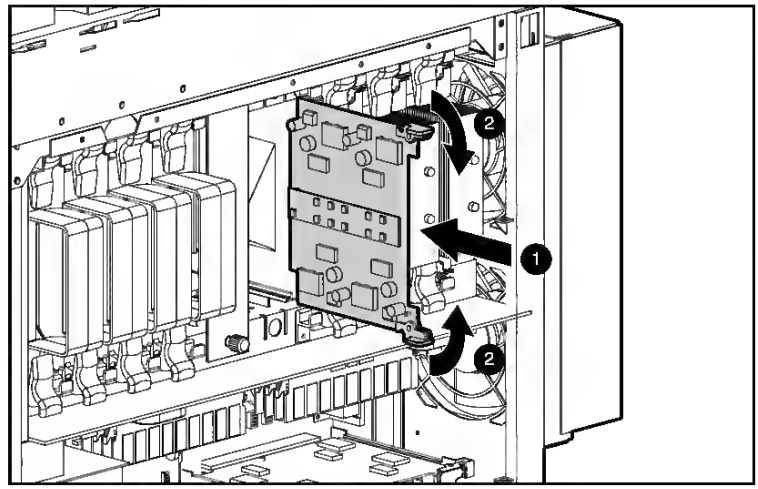

Figure 4-11. Installing the redundant Processor Power Module

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9. Align the new processor, heat pipe facing toward the rear of the server, with the processor slot. Install the processor, pushing firmly until fully seated ❶ and secure by rotating the ejector levers inward ❷.

NOTE: Place thumbs on either side of the heat pipe to avoid touching it.

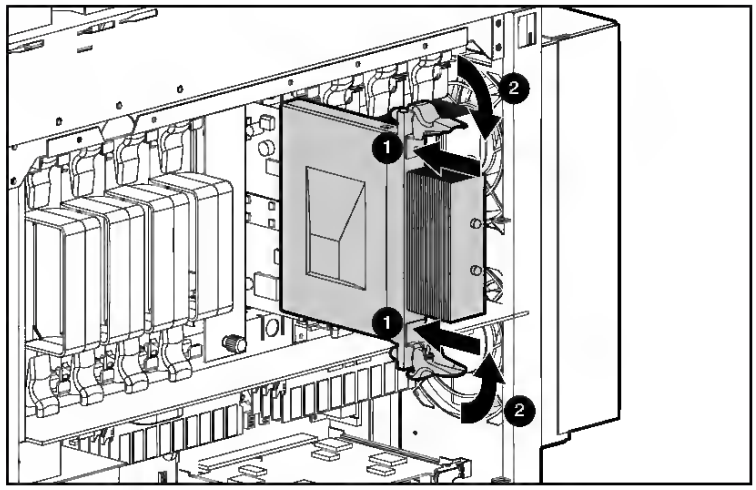

Figure 4-12. Installing the processor

10. Fit the main processor air baffle into the slots at the front of the server ❶, and snap the baffle in at the rear of the server ❷.

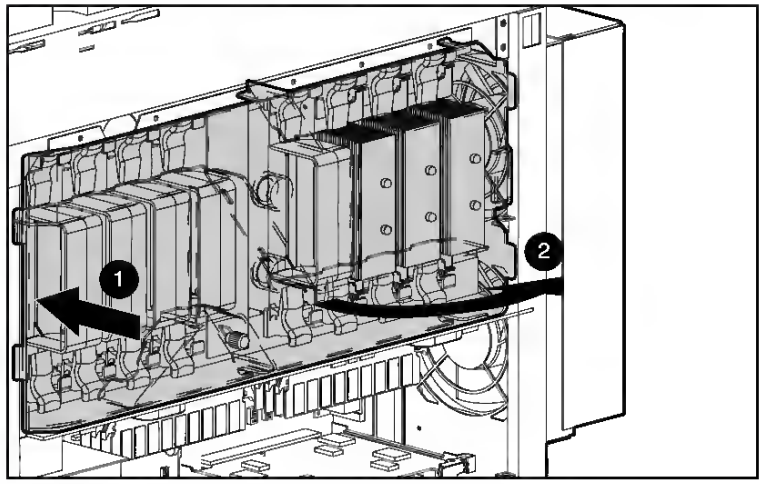

Figure 4-13. Replacing the main processor air baffle

11. Replace the right side access panel and reconnect the power cords. See the "Removing the Right Side Access Panel" section in Chapter 3.

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12. Unlock and open the PCI Hot Plug access doors and verify that system interlock LEDs are normal. See the "System Interlocks" section in Chapter 3.
13. Turn on the server. See the "Powering Up the Server" section in Chapter 3.
14. Verify that the processor was installed correctly. Check the processor frequency, cache size, and slot location by reviewing the POST messages on the system console or processor information under the System Information Menu of the IMD. See Chapter 7, "Integrated Management Log."

Installing Cache Accelerators

Cache Accelerators must be added when processors are installed on more than one processor bus. If both buses are populated but Cache Accelerators are not installed, the system will not boot and an error message will be displayed. The Cache Accelerators are available in the Cache Accelerator option kit (part number 328819-B21). To install the Cache Accelerators, follow the directions below.

CAUTION: The Cache Accelerators are susceptible to damage from electrostatic discharge. Follow the guidelines in Appendix B for preventing electrostatic discharge.

1. If the server is on, place it in Standby mode and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. Remove the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

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3. Pivot the main processor air baffle out at the rear ❶ and remove from the chassis ❷.

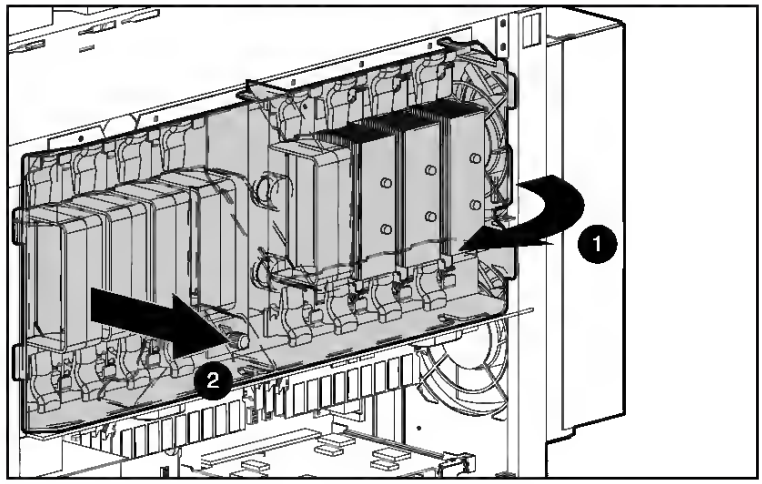

Figure 4-14. Removing the main processor air baffle

4. Remove the processor support brace by loosening the thumbscrews ❶, then pulling it away from the server ❷.

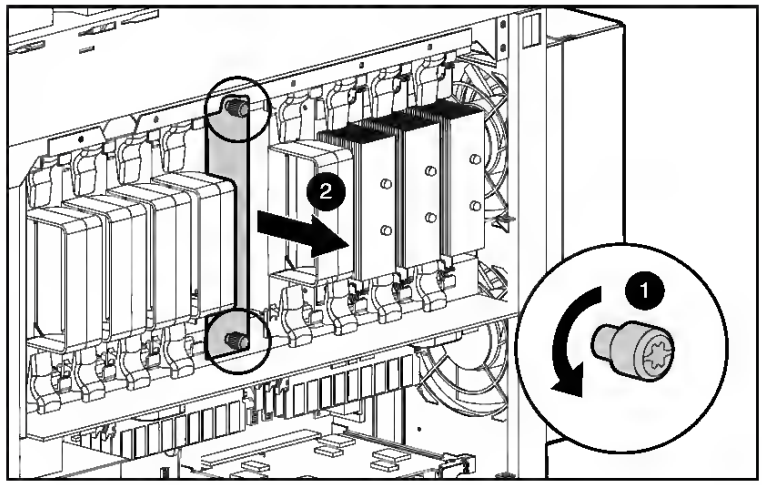

Figure 4-15. Removing the processor support brace

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5. Locate Cache Accelerator slots ❶ and ❷. They are between the two banks of processors.

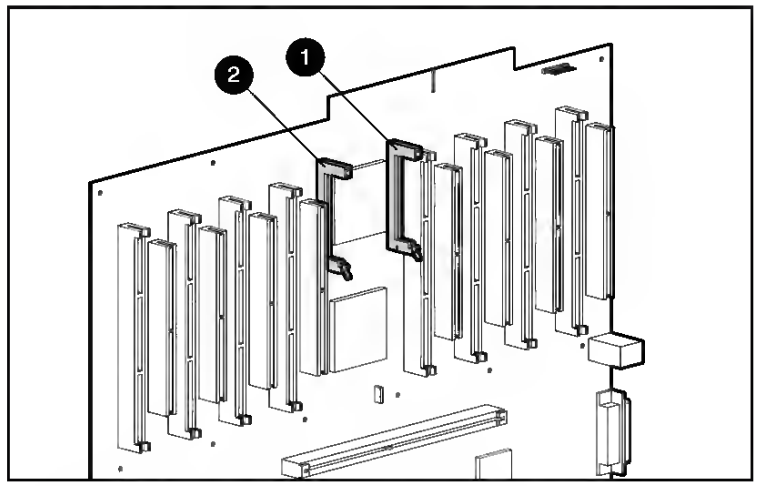

Figure 4-16. Locating the Cache Accelerator sockets

6. Align the key slot on the top edge of each Cache Accelerator with the tab in the Cache Accelerator slot.

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7. Insert each Cache Accelerator directly into the slot ❶ until the module is seated properly. If the tab does not go up when the Cache Accelerator is seated, flip the tab up manually ❷. You will hear a click when the Cache Accelerator is correctly installed.

CAUTION: The Cache Accelerators must be installed as shown. Installing the Cache Accelerators incorrectly will damage your server and could void your warranty.

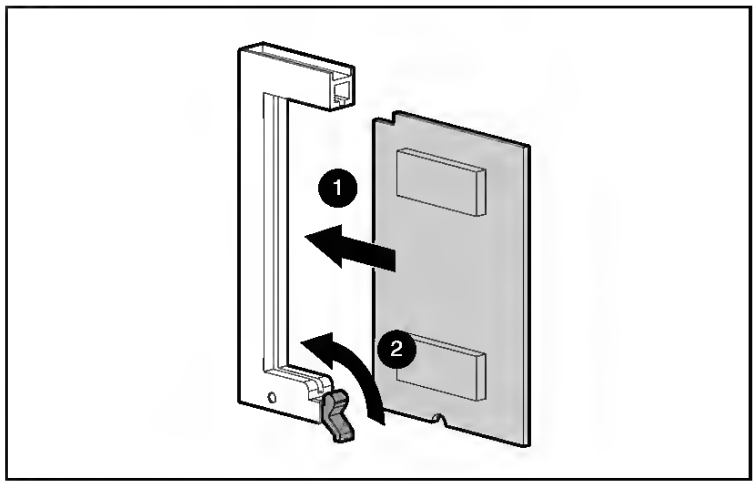

Figure 4-17. Installing a Cache Accelerator

8. Replace the processor support brace.

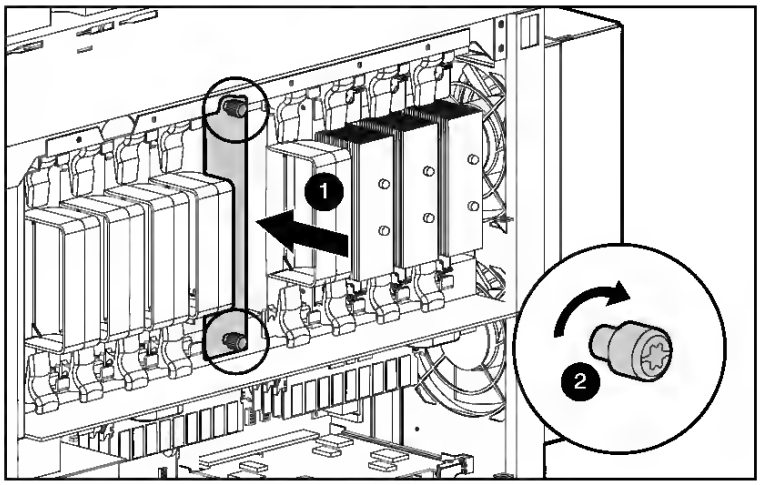

Figure 4-18. Replacing the processor support brace

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9. Fit the main processor air baffle into the slots at the front of the server ❶, and snap the baffle in at the rear of the server ❷.

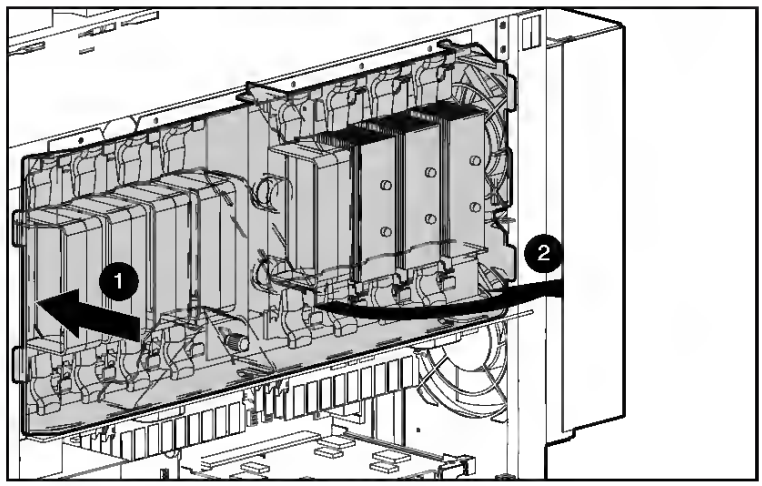

Figure 4-19. Replacing the main processor air baffle

10. Replace the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3. Reconnect the power cords.
11. Turn on the server. See the "Powering Up the Server" section in Chapter 3.

SDRAM Memory

You can expand computer memory by installing industry-standard Dual Inline Memory Modules (DIMMs) into the memory expansion boards. Be aware of the following when installing additional memory:

- Server supports 100-MHz SDRAM 128-MB, 256-MB, 512-MB, or 1-GB DIMMs.
- Memory is expandable to 16 GB (16 × 1-GB DIMMs).
- Groups of two DIMMs of the same size, type, and speed must be installed or removed at a time (the eight groups on the memory expansion board are referred to as Banks 1 through 8).

CAUTION: Compaq recommends the use of Compaq DIMMs. DIMMs from other sources may adversely affect data integrity.

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IMPORTANT: Memory must be installed in identical pairs. Ensure all modules in a logical bank of two have the same 9-digit Compaq part number. Populate bank 1 (slots 1 and 2) first. Continue populating the memory banks in sequential order. Populate bank 8 last. If the memory is not matched as stated, then the server will experience POST Error 207.

To install more memory, refer to one of the following installation sources:

- For an illustrated overview of the installation procedure, refer to the Compaq ProLiant ML750 quick installation poster included in the shipping box or to the label located on the inside of the side access panel of the server.
- For detailed instructions on memory installation, see the following procedure.

Removing and Replacing the Memory Expansion Board

The memory expansion board connects to the processor board, which is located inside the right side access panel. To remove the memory expansion board:

1. If the server is on, place the server in Standby and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. Remove the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

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3. Pivot the main processor air baffle out at the rear ❶ and remove it from the chassis ❷.

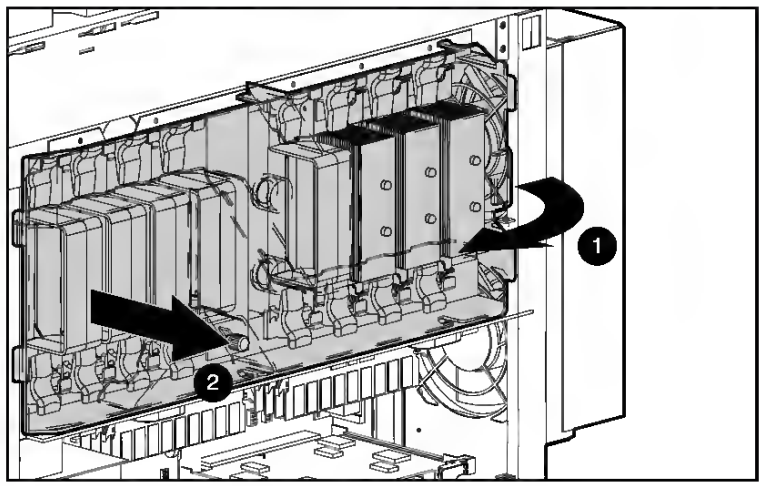

Figure 4-20. Removing the main processor air baffle

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4. Remove the memory expansion board retention bracket by loosening the thumbscrew ❶, rotating the left side of the bracket out of the slot ❷, and pulling the bracket away from the chassis ❸.

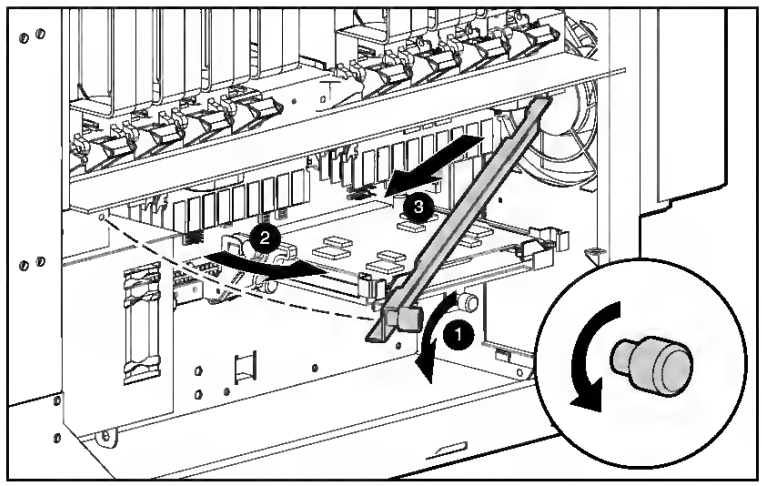

Figure 4-21. Removing the memory expansion board retention bracket

5. Remove the memory expansion board by rotating the ejectors outward ❶ and pulling the board out ❷.

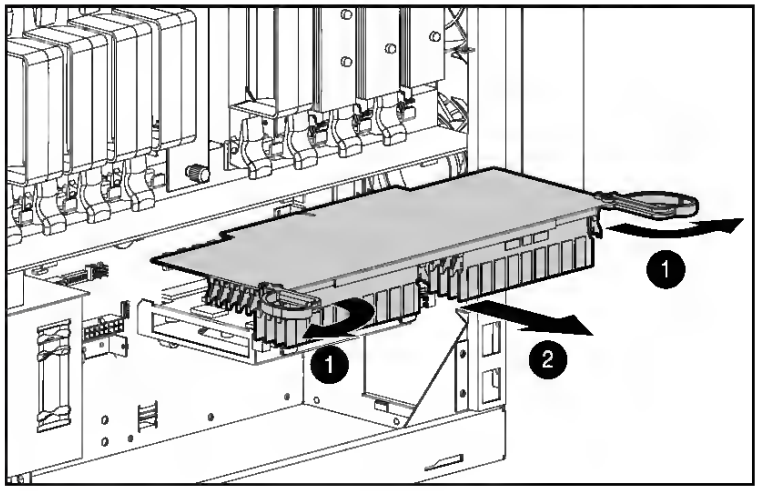

Figure 4-22. Removing the memory expansion board

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6. To install DIMMs, refer to the following section, "Installing More DIMM Memory."
7. To reassemble the server, reverse steps 1 through 4.

NOTE: The memory expansion board is part of the system interlock chain and must be seated properly or the server will not boot. Ensure that the memory expansion board retention bracket is reinstalled after installing the board. For more information see the "System Interlocks" section in Chapter 3.

Installing More DIMM Memory

The memory expansion board has 16 DIMM slots divided into eight banks. You must install two DIMMs (one bank) at a time for the server to recognize the added memory. The two DIMMs in each bank must be the same size. Refer to Figure 4-23 for DIMM locations.

Table 4-3
Memory Expansion Board Banks

Bank	DIMM IDS
1	DIMM 1, DIMM 2
2	DIMM 3, DIMM 4
3	DIMM 5, DIMM 6
4	DIMM 7, DIMM 8
5	DIMM 9, DIMM 10
6	DIMM 11, DIMM 12
7	DIMM 13, DIMM 14
8	DIMM 15, DIMM 16

NOTE: Compaq recommends installing DIMMs in order, starting from the lowest number socket. The DIMM socket IDs are labeled on the memory expansion board.

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To install Compaq DIMMs:

1. If the server is on, place it in Standby mode and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. Remove the right side access panel. See "Removing the Right Side Access Panel" section in Chapter 3.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

3. Remove the memory expansion board. See the "Removing and Replacing the Memory Expansion Board" section earlier in this chapter.
4. Place the memory expansion board, components facing up, on a flat surface.

CAUTION: The ejectors prevent the memory expansion board from lying completely flat. Inserting a DIMM without counter pressure applied behind the socket to the back of the expansion board can cause the memory expansion board to flex and could result in damage. Always support the memory expansion board or apply counter pressure while inserting a DIMM.

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5. Open the DIMM socket latches ❶ for the sockets.

NOTE: Compaq recommends installing DIMMs in order, starting from the lowest number socket. The DIMM socket IDs are labeled on the memory expansion board.

6. Align the key slot on the bottom edge of each DIMM with the tab in the DIMM socket. The DIMM is keyed so that it will only insert one way.

7. Insert each DIMM ❷ directly into the socket until the module is seated properly. You will hear a click when the module is correctly installed.

8. Secure the DIMM by closing the socket latches ❸.

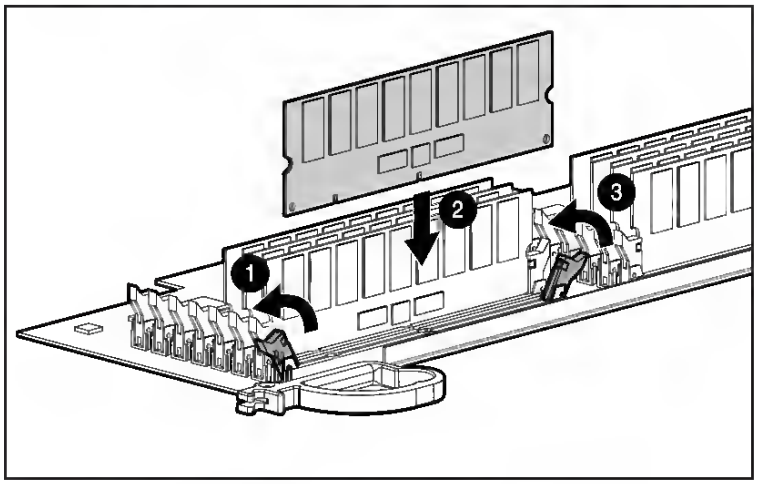

Figure 4-24. Installing a DIMM in the memory expansion board

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9. Verify that the two DIMMs inserted are within the same bank by making sure they are installed on the same row of the memory expansion board.

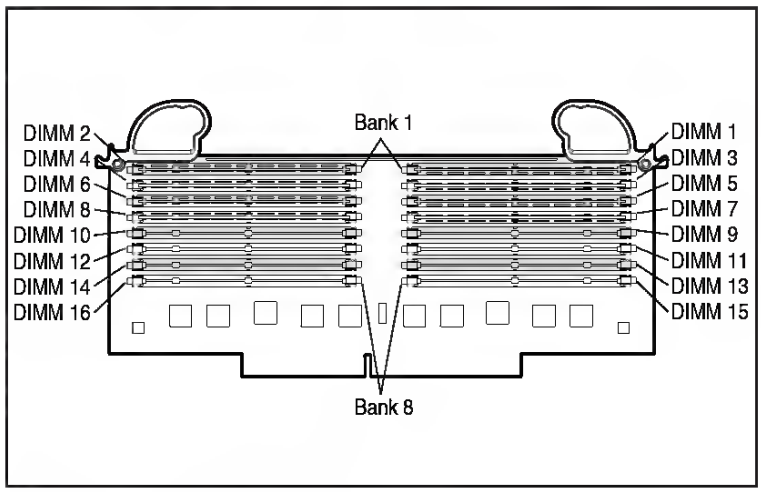

Figure 4-25. Location of DIMM sockets

10. Replace the memory expansion board. See "Removing and Replacing a Memory Expansion Board" earlier in this chapter.
11. Replace the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3. Reconnect the power cords.
12. Open the PCI Hot Plug access doors and verify that system interlock LEDs are normal. See the "System Interlocks" section in Chapter 3.
13. Turn on the server. See the "Power Up the Server" section in Chapter 3.
14. Verify that the memory was installed correctly by reviewing the POST messages on the system console or the memory information under the System Information Menu of the IMD. See Chapter 7, "Integrated Management Log."

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Mass Storage

The following sections provide overviews for installing hard drives, tape drives, and external storage devices.

The ProLiant ML750 server supports three internal hard-drive cages. Each ProLiant ML750 Ultra3 SCSI internal drive cage supports up to seven 1-inch Ultra3 SCSI hard drives (SCSI IDs 0-5 and 8) for a total of 21 hard drives.

The server ships with the top removable media drive bay occupied by a slimline 3.5-inch diskette/IDE CD-ROM drive combination. The bottom two half-height 5.25-inch removable media drive bays are vacant for future installation of mass storage devices.

The following illustration shows three 1-inch internal drive cages, each with seven 1-inch hard drives (0-5 and 8) installed. The removable media area has two available bays (0-1), and a combination CD-ROM and diskette drive (2).

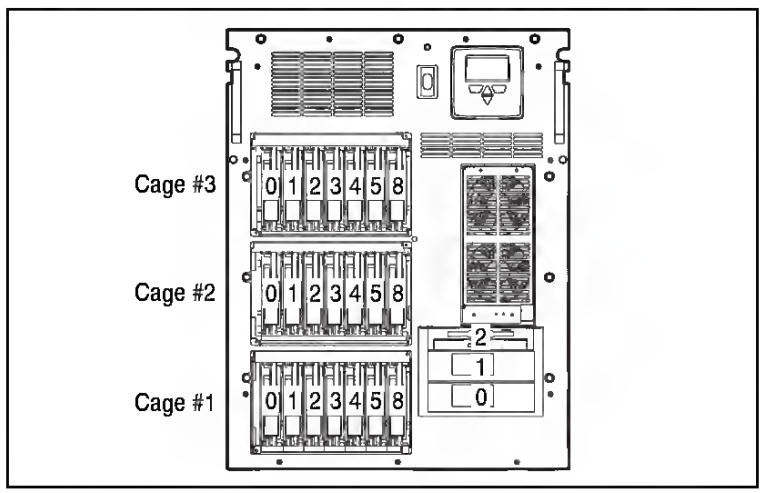

Figure 4-28. Twenty-one 1-inch hot-plug hard drives installed in 1-inch hard drive cages

CAUTION: If a hard drive is removed, a blanking panel must be added for static immunity and airflow improvement.

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SCSI Hard Drive Installation Guidelines

The following guidelines should be noted when adding SCSI hard drives:

- A maximum of seven I-inch SCSI devices may be added in each of the three ProLiant ML750 server internal drive cages.
- The slot in which each drive is installed determines the SCSI ID of that drive. SCSI IDs 6 and 7 are reserved for the controllers.
- If only one SCSI hard drive is used, it should be installed in the lowest-numbered bay. If several drives are installed, the drives should be installed adjacent to each other starting from the lowest-numbered bay, with the system boot drive installed in the lowest-numbered bay.
- In order to maintain proper system cooling, blanking panels should be installed in unused drive bays.

The server supports up to two Smart Array 4250ES controllers or other controllers with Extended SCSI architecture. The two controllers are redundant and are connected by an Intercontroller Link. The controllers are designed to interact with three internal SCSI connectors on the I/O board. Each internal SCSI connector is cabled directly to one internal bard drive cage.

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Installing a Hot-Plug SCSI Hard Disk Drive

CAUTION: Before adding or removing any hot-plug drives, consult your operating system instructions. Failure to do so could result in loss of data or damage to equipment.

1. Remove the blanking panel in an unused drive bay by pushing the retaining clip inward ❶, then pulling the blanking panel outward by the ejector lever ❷.

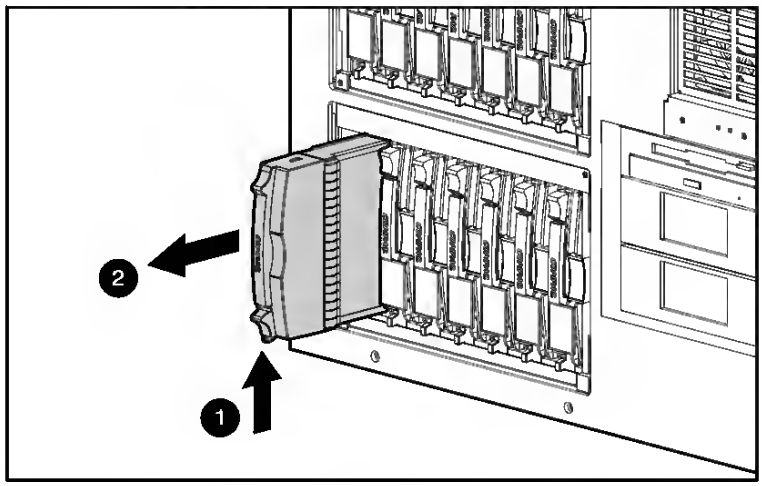

Figure 4-27. Removing a hard drive blanking panel

2. Press the release button for the SCSI hard drive ejector lever ❶, then swing the lever outward ❷.

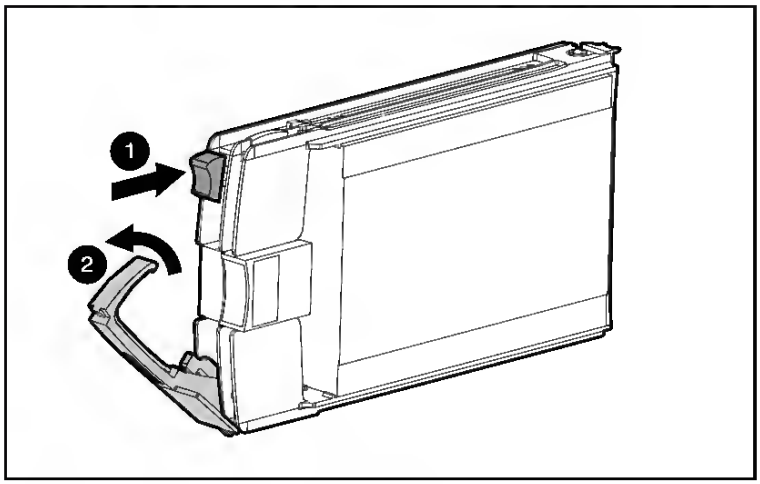

Figure 4-28. Opening the hard drive ejector lever

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3. Insert the SCSI hard drive into the empty drive bay, pushing until securely seated ❶.
4. Secure the SCSI hard drive in the drive cage by swinging the ejector lever closed, as shown below ❷.

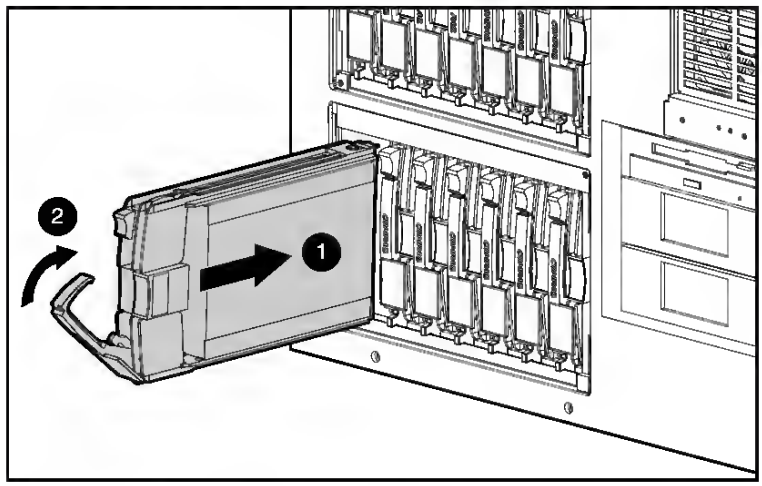

Figure 4-29. Installing a hot-plug SCSI hard drive

CAUTION: Make sure locking hinges are seated properly by pulling gently on the hard drive. If it is not secured, remove the drive and reinstall.

5. Place the hot-plug SCSI hard drive online as directed by your operating system instructions.
6. To remove a hot-plug SCSI hard drive, reverse steps 1 through 5.

CAUTION: Before removing any hot-plug hard drive, read the important guidelines in the following section.

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Important Guidelines about Replacing Hot-Plug SCSI Hard Drives

When replacing hot-plug hard drives, these guidelines must be followed:

- **Never remove a hot-plug drive if the LED is green.** Replace a hot-plug hard drive only when the drive's LED is amber.
- **Never remove more than one drive in the same array at a time.** When a drive is replaced, the controller uses data from the other drives in the array to reconstruct data on the replacement drive. If more than one drive is removed, a complete data set is not available to reconstruct data on the replacement drive.
- **Never remove a working drive when another drive has failed.** The amber Drive Failure LED on the drive tray indicates drives that have been failed by the controller. Permanent data loss will occur if a working drive is removed when replacing a failed drive.
- **Never remove a drive while another drive is being rebuilt.** A drive's Online LED will flash green while it is being rebuilt. A replaced drive is restored from data stored on the other drives.
- **Never turn a ProLiant Storage System off while the server controlling it is powered on.** Doing so will cause the server's Smart Controller to mark the drives as "failed." This could result in permanent data loss.

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- **If an online spare drive is installed, wait for it to complete rebuilding before replacing the failed drive.** When a drive fails, the online spare will become active and begin rebuilding as a replacement drive. After the online spare has been completely rebuilt (the Online LED is solid green), the failed drive should be replaced with a new drive. **Do not** replace the failed drive with the online spare.
- A POST error message (1786) will occur when the system is turned on if one or more drives have been replaced while the system is off. When this occurs you will be prompted to:

  PRESS <F1> TO BOOT THE SYSTEM AND REBUILD THE REPLACED DRIVE, OR

  PRESS <F2> TO BOOT THE SYSTEM AND NOT REBUILD THE DRIVES.

CAUTION: Pressing **F2** will cause permanent data loss to the entire logical drive. **F2** should be pressed only if all of the drives have been replaced or if complete data loss is desired.

NOTE: When a drive configured for fault tolerance is replaced, the replacement drive will automatically begin restoration when it is installed. When a drive is in the process of being restored, the Online LED flashes green. The LED will continue to flash until the drive is completely restored.

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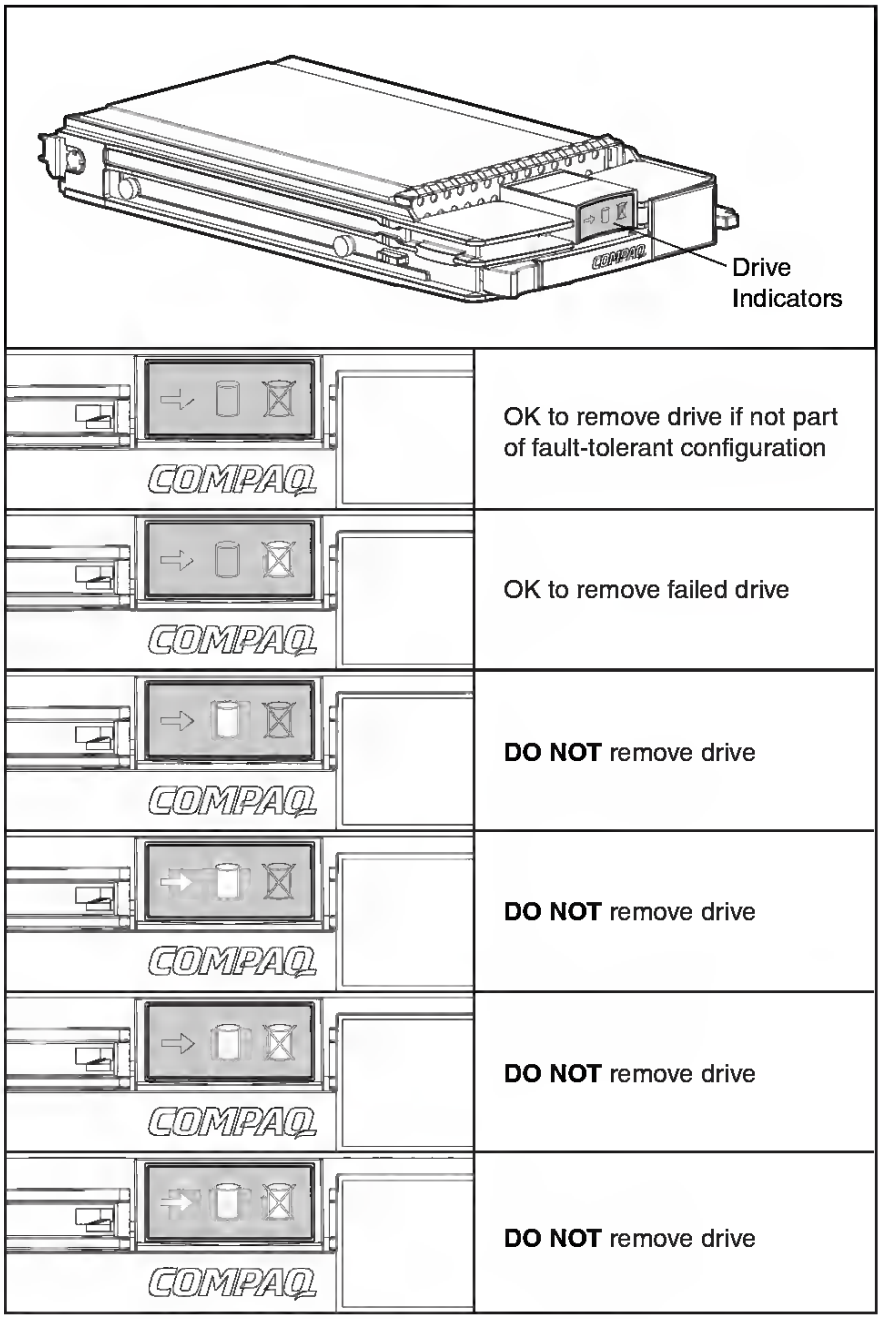

Figure 4-30. Hard drive LEDs

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Installing a Tape Drive

One full-height or two half-height removable storage devices can be installed in the bottom two vacant removable media drive bays. To cable the device, see Chapter 5, "Cabling the Server," or see the procedure below for general cabling instructions.

1. If the server is on, place the server in Standby mode and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. Remove the removable media frame.

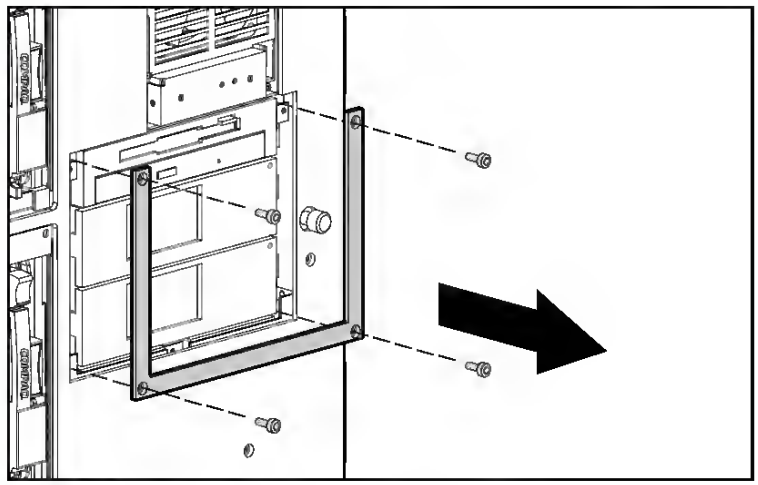

Figure 4-31. Removing the removable media frame

3. To install a full-height device, remove both of the blanking panels.

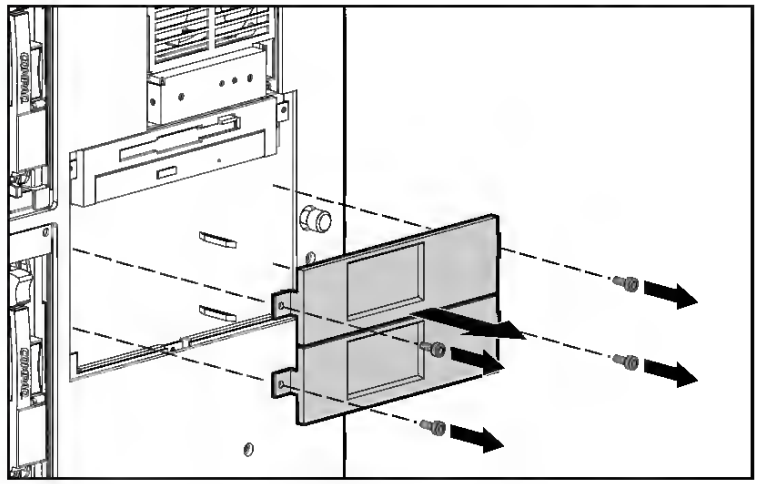

Figure 4-32. Removing two removable media blanking panels

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4. Install a full-height tape drive in the open media bays.

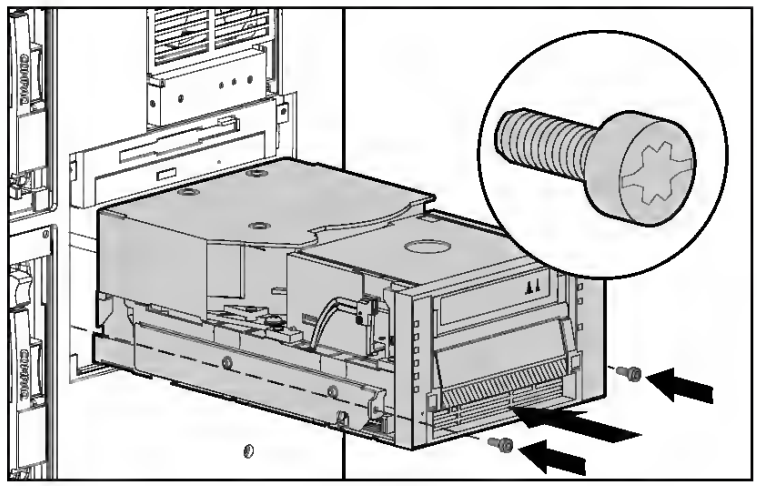

Figure 4-33. Installing a tape drive

5. Connect the device to a PCI SCSI controller card.

NOTE: See Chapter 5, "Cabling the Server," for more information on cabling from PCI SCSI expansion slots. For adding PCI expansion boards, see the "Adding Expansion Boards (PCI Hot Plug Slots 1 through 11)" section later in this chapter.

6. Remove the right side access panel. See the "Removing the Right Side Access Panel" section in Chapter 3.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

7. Attach one of the media power cables and the terminated SCSI cable to the media drive.

NOTE: The ProLiant ML750 server supports a two-device terminated SCSI cable that is packaged in the bottom of the removable media cage inside your server.

8. Reinstall the removable media frame.
9. Replace the right side access panel.
10. Reconnect the power cords and turn on the server. See the "Powering Up the Server" section in Chapter 3.

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External Storage Devices

Optional mass storage devices can be connected to the ProLiant ML750 server by installing a PCI expansion board with an external connector.

For information on cabling to PCI expansion boards, see Chapter 5, "Cabling the Server." For information on adding or removing PCI Hot Plug Expansion Boards, see the "Adding Expansion Boards (PCI Hot Plug Slots 1 through 11)" section later in this chapter.

To install an external storage device, refer to the installation documentation that came with the external storage device. The following illustration provides only an overview of this installation.

1. If the server is on, place it in Standby mode and disconnect the power cords. See the "Powering Down the Server" section in Chapter 3.
2. If the external storage device is on, disconnect the power.
3. Connect one end of the SCSI cable to tbe SCSI controller expansion board connector.
4. Connect the other end of the SCSI cable to the appropriate external SCSI connector on the rear panel of the external storage device.

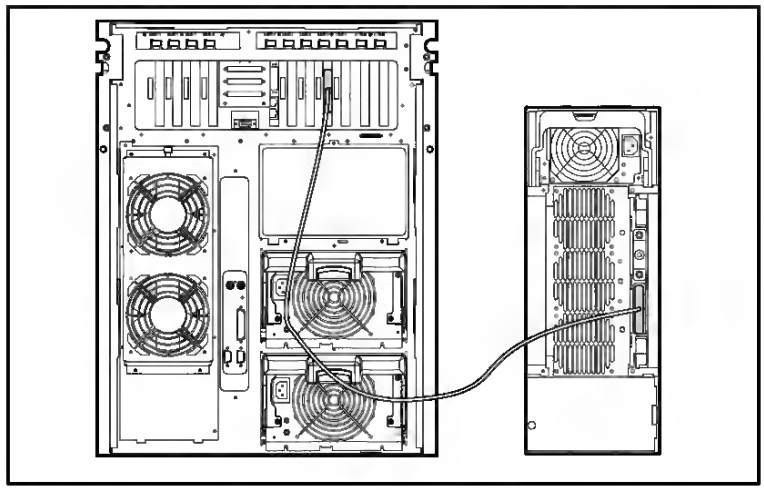

Figure 4-34. Connecting the external mass storage device

5. Reconnect the power cords and turn on the server. See the "Powering Up the Server" section in Chapter 3.

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6. Restore power to the external storage device.
7. To configure the device, run the ROM-Based Setup Utility. Refer to the Server Setup and Management pack shipped with your server for more information.

I/O Expansion Boards

The ProLiant ML750 server supports PCI Hot Plug. PCI Hot Plug and the server's operating system work together to allow the following hot-plug actions:

- **Hot-replacement of adapters**-This feature allows you to replace a failed adapter with an identical adapter without powering down the server.
- **Hot-addition of adapters**-This feature allows you to install new PCI expansion boards in previously empty slots without powering down the server.
- **Hot-upgrade of adapters**-This feature allows you to replace an adapter with a newer version of the adapter without powering down the server.

PCI Hot Plug is backward compatible, although system components fit into one of two categories: hot-plug aware or non-hot plug aware. The following three components are required in the server for complete PCI Hot Plug capability:

- PCI Hot Plug system hardware (available in this server)
- Operating system with PCI Hot Plug support (currently Microsoft Windows 2000, Microsoft Windows NT, Novell NetWare, and SCO UNIX-support level varies)
- PCI Hot Plug device drivers (available from operating system vendors, Compaq SmartStart CD, and some individual hardware vendors)

IMPORTANT: If any of the three required components are non-hot plug aware, the system is fully functional, though it is not PCI Hot Plug capable.

NOTE: The Remote Insight Board/PCI is not hot-plug aware and does not have PCI Hot Plug capability.

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Locating the I/O Expansion Slots

The I/O expansion slots are located on the I/O board directly beneath the top access panel. The I/O slots can be accessed using the PCI Hot Plug access doors.

To open the PCI Hot Plug access doors:

WARNING: To reduce the risk of personal injury from hazardous energy or damage to the equipment when working on energized servers:

- Remove all watches, rings, and any other loose-fitting jewelry.
- Avoid the use of conductive tools that could bridge live parts.

WARNING: There is a risk of injury or damage to the equipment from hazardous energy. The PCI Hot Plug access doors provide access to hazardous energy circuits.

- The doors should remain locked during normal operation.

  or

- The server should be installed in a controlled access location where only qualified personnel have access to the server.

1. Insert the key and turn it counterclockwise ❶.
2. Pull the handle toward the side of the server ❷.

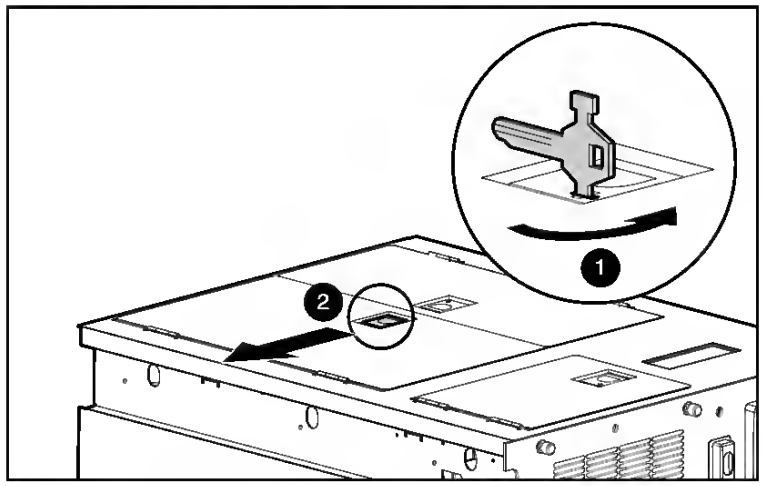

Figure 4-35. Unlocking the PCI Hot Plug access doors

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3. Open the PCI Hot Plug access doors.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

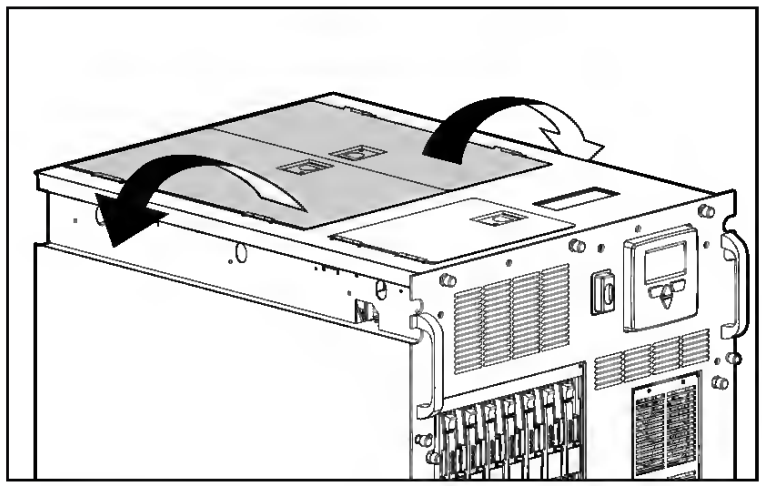

Figure 4-36. Opening the PCI Hot Plug access doors

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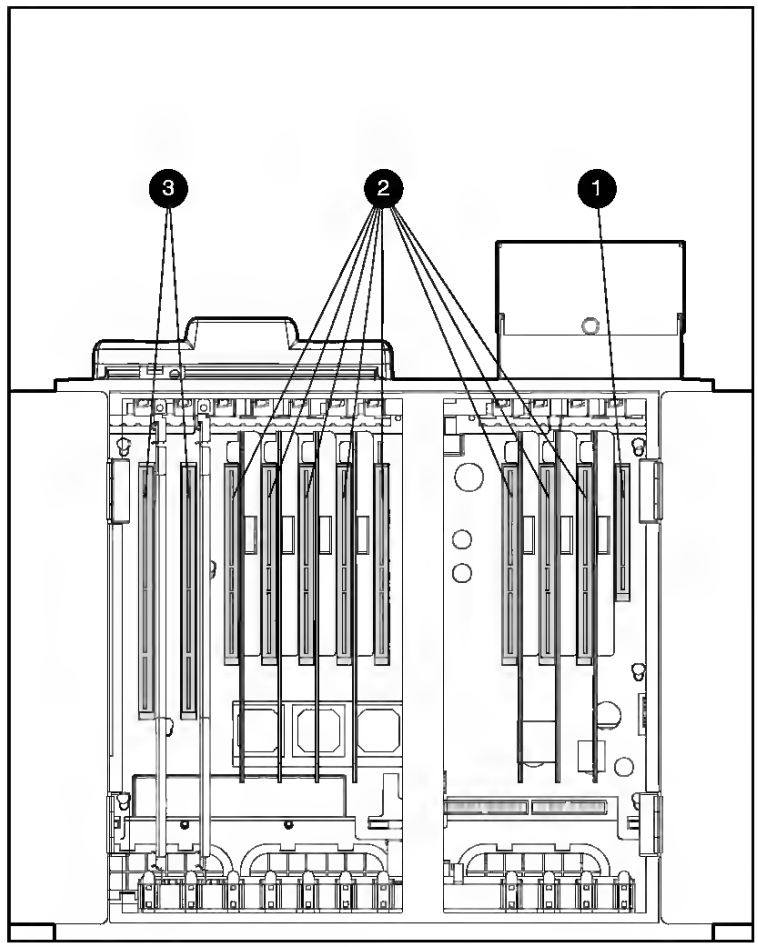

Figure 4-37. Top view of I/O slots

Table 4-4
Top View of I/O Slots

ID	Slot Description
❶	32-bit PCI Hot Plug Slot 1
❷	64-bit PCI Hot Plug Slots 2-9
❸	64-bit PCI Hot Plug with Extended SCSI Slots 10-11

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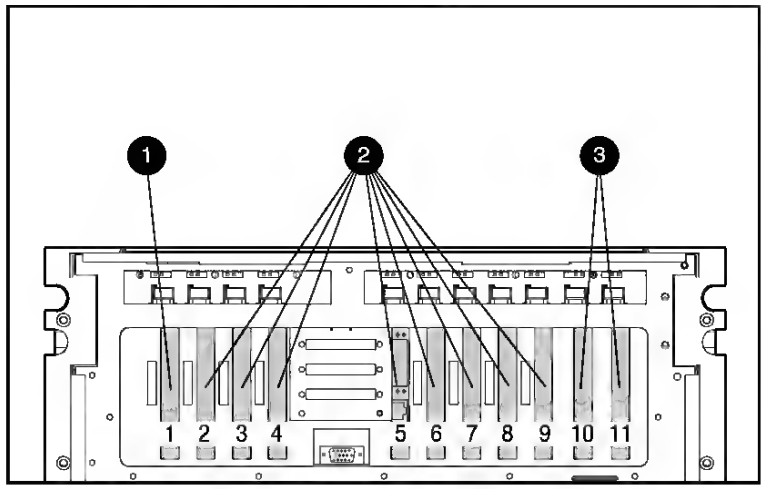

Figure 4-38. View of I/O slot connections from rear of server

Table 4-5
Rear View of I/O Slots

ID	Slot Description
❶	32-bit PCI Hot Plug Slot 1
❷	64-bit PCI Hot Plug Slots 2-9
❸	64-bit PCI Hot Plug with Extended SCSI Slots 10-11

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PCI Hot Plug LEDs

The PCI Hot Plug amber LED ❶ and green LED ❷ provide a visual reference to the status of each slot. The LEDs are viewed from the rear of the server or by opening the PCI Hot Plug access doors on the top panel.

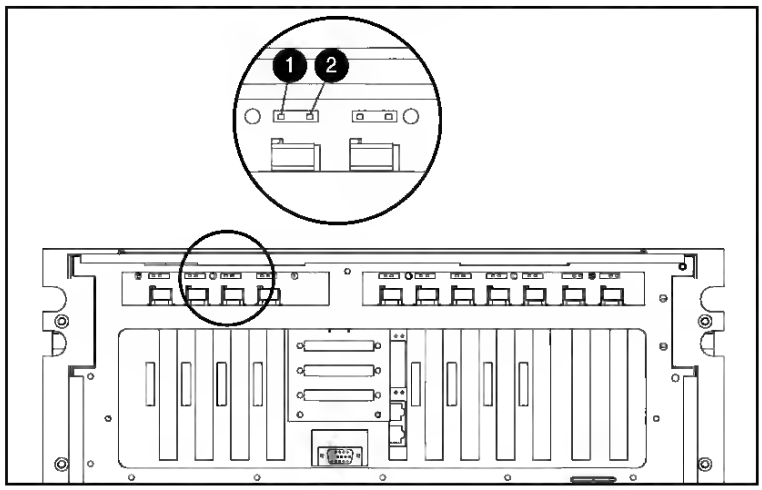

Figure 4-39. PCI Hot Plug LEDs from rear of server

The following table indicates the appropriate slot condition and status for each state of the two LEDs.

Table 4-6
PCI Hot Plug LEDs

Amber LED	Slot Status	Green LED	OK to Open	Slot Status
Off	Slot does not require attention.	On	No	Power is applied to slot.
On	Slot requires attention. There may be a problem with the slot, the PCI board, or the driver. Check the green LED before opening the slot.	Flashing	No	Power to slot is being turned off or on. This process may take several minutes. DO NOT open the slot release lever until the green LED is completely off.
		Off	Yes	You may replace or remove the board in this slot only.

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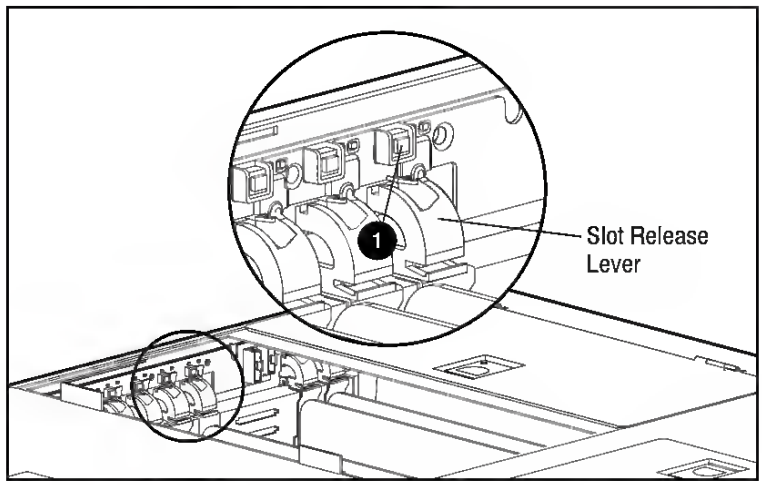

Figure 4-40. PCI Hot Plug button under the PCI Hot Plug Access doors

Each PCI Hot Plug button ❶ is used to activate or deactivate its associated PCI Hot Plug slot. Activating or deactivating a PCI Hot Plug slot can also be accomplished through the operating system PCI Hot Plug software application. For more information on the PCI Hot Plug software application, see "PCI Hot Plug Operating System Support" in the following section.

PCI Hot Plug Operating System Support

Software support is an integral part of PCI Hot Plug. Compaq, in partnership with Microsoft, Novell, and SCO, has developed PCI Hot Plug software support for each operating system.

You can use either the PCI Hot Plug button on the server or your operating system PCI Hot Plug software to control the PCI Hot Plug slots. You can use the software to indicate that you want to replace an expansion board in the hot-plug slot or configure a board that you have already added to the system. The PCI Hot Plug software also allows you to enable or disable specific slots in the system. Supported operating systems include:

- Microsoft Windows 2000
- Microsoft Windows NT 4
- Novell NetWare
- SCO UnixWare

NOTE: IBM OS/2, Sun Solaris, and Banyan Vines do not support PCI Hot Plug.

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Microsoft Windows 2000

Supported PCI Functionality

Compaq PCI Hot Plug support under Microsoft Windows 2000 provides full PCI Hot Plug capability including:

- Hot Add
- Hot Replacement
- Hot Removal
- Hot Upgrade

PCI Hot Plug operations can be initiated through the use of the PCI slot power buttons or the Windows 2000 Eject/Remove Hardware applet that is accessed through the Windows Status box.

CAUTION: Before removing any PCI module, be sure to turn off power to the PCI slot by using either the PCI power button or the Windows 2000 Eject/Remove Hardware applet. Failure to do so will result in a "surprise style" removal and may result in system failure.

Software Components

PCI Hot Plug support for Windows 2000 is provided through the PCI Hot Plug Filter driver, the Compaq Systems Management driver, and hot-plug-aware drivers. All of these components are included in the Compaq Support Paq for Windows 2000.

Installing PCI Support

Compaq Support Paq for Microsoft Windows 2000, version 5.00A or later, contains all of the software components required to support Compaq PCI Hot Plug. Included on the Support Paq are hot-plug-aware device drivers, such as Compaq NC 3131 Controllers and the Smart Array 3200 Controller. The Support Paq also provides the PCI Hot Plug Filter driver, and the System Management drivers.

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Microsoft Windows NT 4.0

Supported PCI Functionality

Compaq PCI Hot Plug support under Microsoft Windows NT 4.0 provides hot replacement for Compaq boards. An adapter equipped with a hot-plug-aware device driver can be replaced without shutting down the system. If the adapter is part of a redundant pair, the failed adapter can be replaced while users continue to communicate with the server through the additional adapter. Once an adapter has been replaced, PCI Hot Plug technology enables you to bring the PCI slot back into service.

NOTE: Under the current version of Windows NT 4.0, hot addition is not possible. Empty slots are powered up at boot and opening the slot release lever will cause the slot to be powered off. If you add a board in this manner, you will not be able to power up the slot.

Software Components

The software components include the Compaq PCI Hot Plug Utility, the Compaq Remote Monitor service (CPQRCMC), the Compaq Systems Management driver (SYSMGMT.SYS), and hot-plug-aware drivers.

The Compaq PCI Hot Plug Utility allows you to monitor and control PCI Hot Plug slots. You can accomplish the following tasks:

- View the current power and fault status of all PCI Hot Plug slots in the system.
- Turn the power on and off to a slot to permit controller replacement.
- View the name, driver name, paired state, and status information about the controller in a slot.
- Manage the hot-plug slots of local and remote systems.

The Compaq Remote Monitor Service (CPQRCMC) is central to the operation of PCI Hot Plug technology. CPQRCMC acts as the connection point for all hot-plug communications. By using the CPQRCMC service as the primary interface, Compaq delivers PCI Hot Plug capability without requiring hot-plug support directly in the Windows NT operating system.

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Installing PCI Support

Compaq Support Paqs for Microsoft Windows NT 4.0 (CSPs), contains all of the software components required to support Compaq PCI Hot Plug. Included in the Compaq Support Paq for Windows NT are hot-plug-aware device drivers, such as Compaq NC 3131 Controllers and the Smart Array 3200 Controller. The CSP for Windows NT also provides the PCI Hot Plug Utility, Hot Plug service, and the System Management driver.

Significant points to consider when installing Windows NT on a PCI Hot Plug system are:

- Automatic device detection may not yield results consistent with the actual hardware configuration. Confirm the auto detect by looking at the hardware.
- Multiple network adapters may complicate the network setup phase.
- PCI Hot Plug technology for Windows NT 4.0 relies on the presence of the Windows NT Remote Procedure Calls (RPC) service. See the Windows NT documentation for more information.
- PCI Hot Plug technology for Windows NT 4.0 requires installation of the Compaq Support Paq for Windows NT to provide updated drivers, utilities, and operating system support code.

For more information on Windows NT support for PCI Hot Plug technology, refer to the *PCI Hot Plug Administration Guide* on the Server Documentation CD, the Microsoft online help file, or the Compaq technology brief "Deploying PCI Hot Plug on Compaq Servers in a Microsoft Windows NT Environment" on the Compaq website:

http://www.compaq.com

Novell NetWare

Supported PCI Functionality

Compaq PCI Hot Plug support under Novell NetWare provides full PCI Hot Plug capability for most PCI adapters including:

- Hot Replacement
- Hot Upgrade
- Hot Addition
- Hot Removal

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To protect hardware investments, the Novell PCI Hot Plug architecture leverages the modularity of NetWare to minimize the changes required of third-party adapter board software. To take advantage of PCI functionality, networking and storage device drivers must be written to current specifications. The NetWare Peripheral Architecture (NWPA) specifies the driver architecture for storage devices. The Novell Open Data-Link Interface (ODI) specification documents the driver architecture for network devices. Drivers that are compliant with these specifications will be compatible with PCI Hot Plug and will continue to work in non-hot-plug environments.

Software Components

Novell uses a central component, the Novell Event Bus, to facilitate communications between different software modules. The Event Bus is implemented as a NetWare Loadable Module (NLM), allowing you to implement PCI Hot Plug on existing versions of NetWare. Listed below are the components of the PCI Hot Plug architecture for NetWare:

- Novell Event Bus (NEB)
- Novell Configuration Manager (NCM)
- OEM Specific System Bus Driver (SBD)
- Novell Configuration Manager Console (NCMCON)
  - Device drivers
  - Other boards
  - Installation tools

Installing PCI Support

Compaq provides PCI Hot Plug support for NetWare via Compaq Support Paq for Novell NetWare.

For more information, refer to the *PCI Hot Plug Administration Guide* on the Compaq Server Documentation CD, the NetWare online documentation, or the Compaq white paper, *PCI Hot Plug Expand Feature on Compaq Servers in Novell NetWare Environments*, located on the Compaq website:

http://www.compaq.com

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SCO UnixWare

Supported PCI Functionality

Compaq support of PCI Hot Plug under UnixWare 7.01 provides hot replacement, hot upgrade, and hot addition for a variety of boards. You can eliminate downtime when you replace faulty adapters, upgrade your systems, and dynamically add new adapters.

Software Components

The primary software components for hot-plug support include:

- Hot-plug Admin Manager user interface
- Hot-plug Controller interface
- Netscape AutoConfig Subsystem
- Hot-plug system and device drivers
- Device Driver Interface (DDI-8) specification

The Admin Manager is the graphical user interface for PCI Hot Plug technology. All user commands to add, remove, or replace an adapter funnel through the Admin Manager. The Hot Plug Admin Manager is incorporated into SCO's existing system-managed framework called SCO Admin.

The Hot Plug Controller interface tracks system component information and manages the actions required for hot-plug functions. The Hot Plug Controller Interface processes Hot Plug Services Library (HPSL) requests by interfacing with the Netscape AutoConfig Subsystem. Using the existing Compaq Support Software 2.1, auto-configuring framework hot-plug events will be handled through the resource manager database, which has been updated for dynamically loading and unloading individual device drivers.

The device driver interface specification defines how device drivers communicate with the UnixWare operating system and hot-plug software. SCO's Device Driver Interface version 8 (DDI-8) and other device driver interfaces are enhanced to provide the functions for adding or removing driver instances and suspending or resuming operation in conjunction with hot-plug operations.

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Installing PCI Support

Compaq Enhanced Functionality Support (EFS) diskettes for Unix contain all the software components to support Compaq PCI Hot Plug. Compaq also provides the Compaq Support Paq for SCO UnixWare which contains the software components.

For more information, refer to the *PCI Hot Plug Administration Guide* on the Server Documentation CD, the UnixWare online documentation, or the Compaq white paper, *PCI Hot Plug Technology with SCO Software Architecture*, found on the Compaq website at

http://www.compaq.com

For further information on the PCI Hot Plug Button and PCI Hot Plug software, see the "PCI Hot Plug Important Facts" in the *PCI Hot Plug Administration Guide* on the Server Documentation CD.

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Supported I/O Expansion Boards

The I/O board of the ProLiant ML750 server has 11 expansion slots. All slots are PCI Hot Plug capable and will support a variety of industry standard I/O expansion boards.

NOTE: Slots 10 and 11 are capable of operating at 66 MHz PCI, but the PCI bus will only operate as fast as the slowest card installed in either slot.

Table 4-7
Supported I/O Expansion Boards

Slot No.	Expansion Board
1	Remote Insight Board/PCI or Industry Standard 32-bit PCI Board (universal or 5-V keying)
2-4	Industry Standard 32-bit or 64-bit PCI Board (universal or 5-V keying)
5	Primary Network Interface Card or Industry Standard 32-bit or 64-bit PCI Board (universal or 5-V keying)
6-9	Industry Standard 32-bit or 64-bit PCI Board (universal or 5-V keying)
10-11	Compaq Array Controllers with Extended SCSI architecture or Industry Standard 33-MHz or 66-MHz PCI (32-bit or 64-bit/universal or 3.3-V keying)

NOTE: The primary Compaq dual-port 10/100 TX network adapter is normally located in Slot 5. Remove the terminator plug from the second RJ-45 connector when using the dual-port capabilities.

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Bus Distribution

The I/O board in the ProLiant ML750 server uses two 33-MHz PCI buses and, one 66-MHz PCI bus. The following table illustrates the PCI expansion slots associated with each of the three PCI buses.

NOTE: The tertiary PCI bus is capable of operating at 66-MHz PCI, but this bus will only operate as fast as the slowest card installed in Slots 10 or 11.

Table 4-8
Bus Distribution of PCI Hot Plug Slots

Number	Associated PCI Bus	PCI Hot Plug Slot No.
❶	Primary PCI Bus (Slot 1—32-bit/33-MHz) (Slots 2 through 4—64-Bit/33-MHz)	Slots 1 through 4
❷	Secondary PCI Bus (64-Bit/33-MHz)	Slots 5 through 9
❸	Tertiary PCI Bus (64-Bit/66-MHz)	Slots 10 and 11

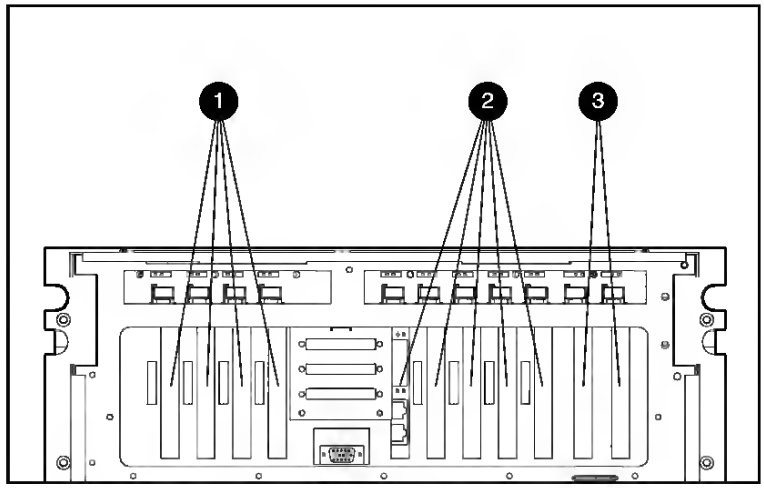

Figure 4-41. PCI bus assignments

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Removing a PCI Hot Plug Expansion Board

1. Unlock and open the PCI Hot Plug access doors on the top access panel.

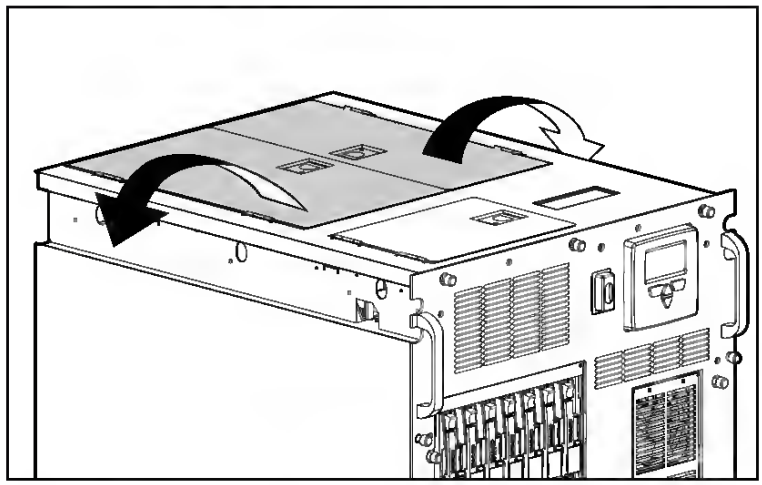

Figure 4-42. Opening the PCI Hot Plug access doors

2. Use the PCI Hot Plug Button or software application to turn power off to the slot. The green LED will flash during the power down transition and will turn off when power down is complete. For details on PCI Hot Plug LEDs, see "PCI Hot Plug LEDs" earlier in this chapter.

CAUTION: DO NOT open the slot release lever unless the slot's green PCI Hot Plug LED is off. System power down and subsequent data loss could occur.

3. When the slot's green LED is off, disconnect cables to the PCI board.

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4. Press the button ❶ on the top of the slot release lever and open the lever ❷.
5. Remove the board ❸.

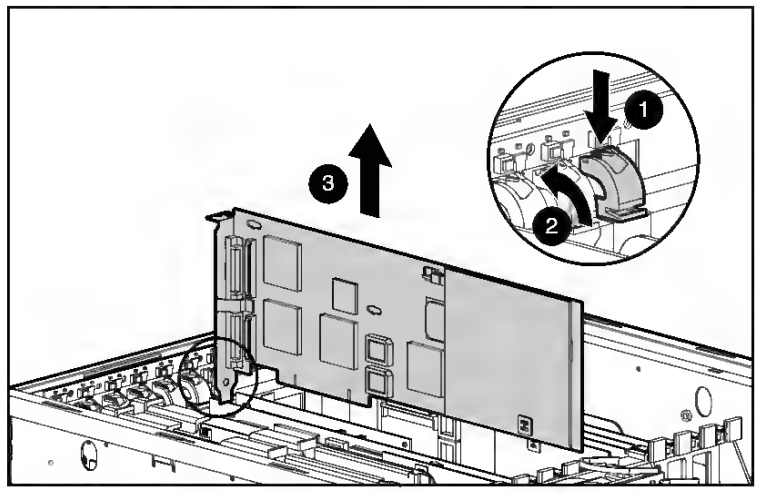

Figure 4-43. Removing the PCI expansion board

6. Install an expansion slot cover ❶.
7. Close the slot release lever ❷. Ensure that the lever latches into the closed position.

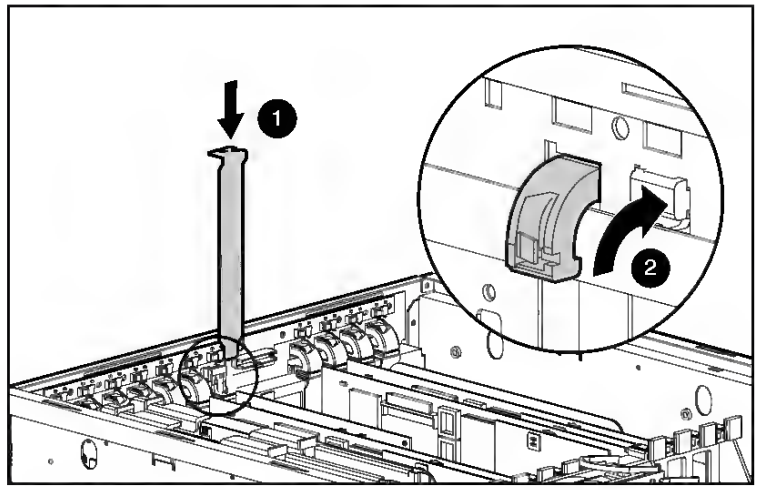

Figure 4-44. Installing an expansion slot cover

8. Close and lock the PCI Hot Plug access doors.

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Adding Expansion Boards (PCI Hot Plug Slots 1 through 11)

All slots on the ProLiant ML750 server I/O board are PCI Hot Plug capable and support a variety of industry-standard expansion boards. For details, see the "Supported I/O Expansion Boards" section earlier in this chapter.

IMPORTANT: If you use a Remote Insight Board/PCI, Compaq recommends that it be installed in Slot 1. If no Remote Insight Board/PCI is to be used with the server, any 32-bit card may be used in Slot 1.

NOTE: Compaq array controllers with Extended SCSI are only supported in Slots 10 and 11 and are keyed to prevent inadvertent insertion into other slots. For detailed instructions on installing or removing Compaq array controllers with Extended SCSI, see the corresponding sections later in this chapter. For more information on redundant Compaq array controllers with Extended SCSI, see the "Adding Compaq Array Controllers with Extended SCSI" section later in this chapter.

1. Unlock and open the PCI Hot Plug access doors on the top access panel. See "Locating the I/O Expansion Slots" earlier in this chapter.
2. If the slot's PCI Hot Plug green LED is on, use the PCI Hot Plug button or software application to turn power off to the slot. The green LED will flash during the power down transition and will turn off when power down is complete. For details on PCI Hot Plug LEDs, see the "PCI Hot Plug LEDs" section earlier in this chapter.

CAUTION: DO NOT open the slot release lever unless the slot's green PCI Hot Plug LED is off. System power down and subsequent data loss could occur.

NOTE: The PCI Hot Plug Button allows you to press the button again within five seconds of the first press to cancel the action.

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3. Press on the top ❶ of the appropriate expansion slot release lever and open the lever toward the rear ❷ of the expansion slot.
4. Remove the expansion slot cover ❸.

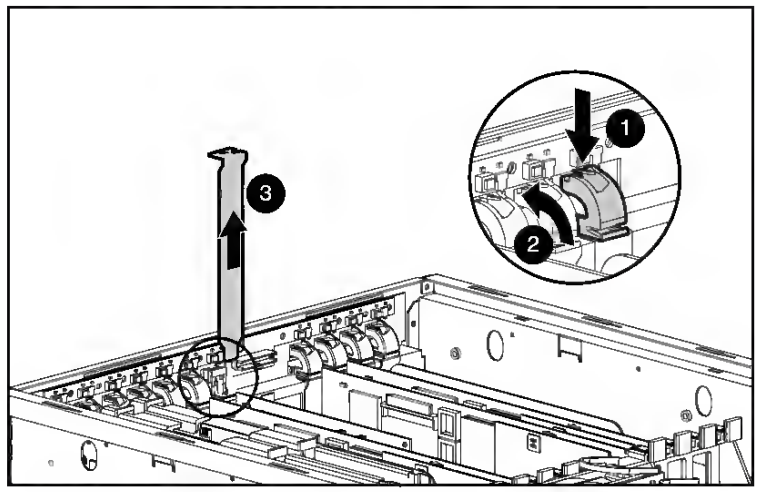

Figure 4-45. Preparing the Hot Plug expansion slot for installation

IMPORTANT: If the board to be installed is a Smart Array 3200 Controller, remove the cache board shipping bracket before installation. This will allow the board to fit securely in the slot.

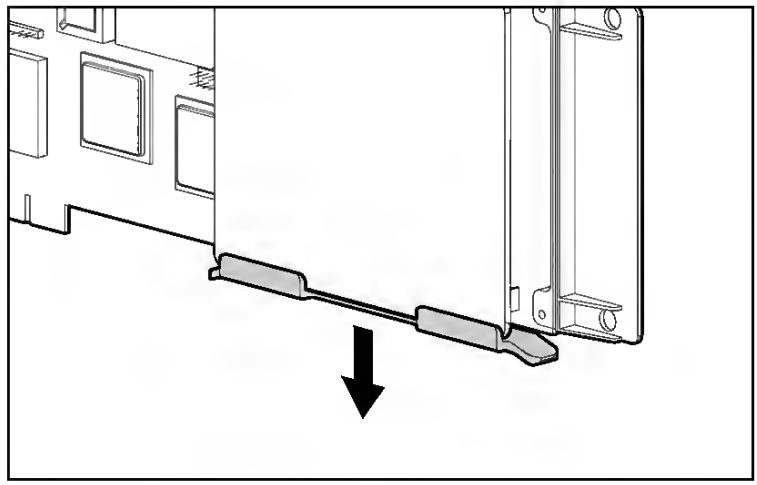

Figure 4-46. Removing the Smart Array 3200 Controller cache board shipping bracket

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5. Insert the PCI expansion board into the appropriate expansion slot, pushing firmly until securely seated ❶.

6. Close the expansion slot release lever from the rear of the unit ❷ to secure the board. Make sure the lever latches into the closed position.

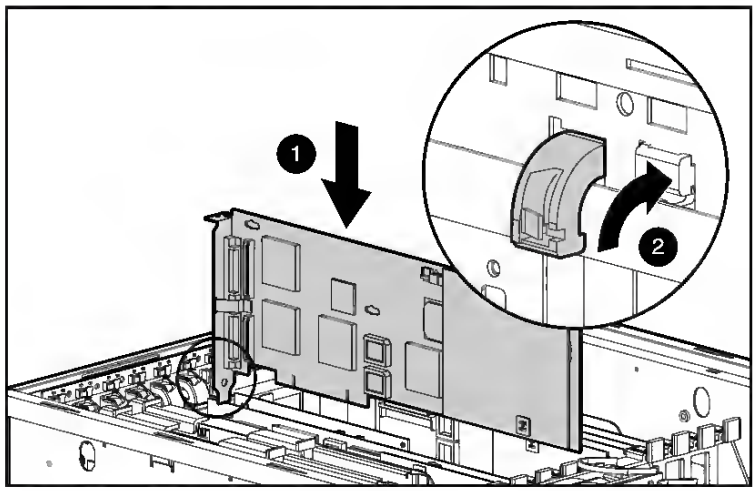

Figure 4-47. Inserting the PCI expansion board

7. Connect the expansion board I/O cable as appropriate.

8. To keep the full-length expansion boards fully seated, be sure the L-shaped slot keeper tabs on the plastic expansion board guide are positioned over the forward end of the expansion board. Using the slot keepers is especially important when expansion boards are added or the server is moved.

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9. Activate power to the slot through the PCI Hot Plug software application or by pressing the PCI Hot Plug button ❶ above the corresponding I/O expansion slot.

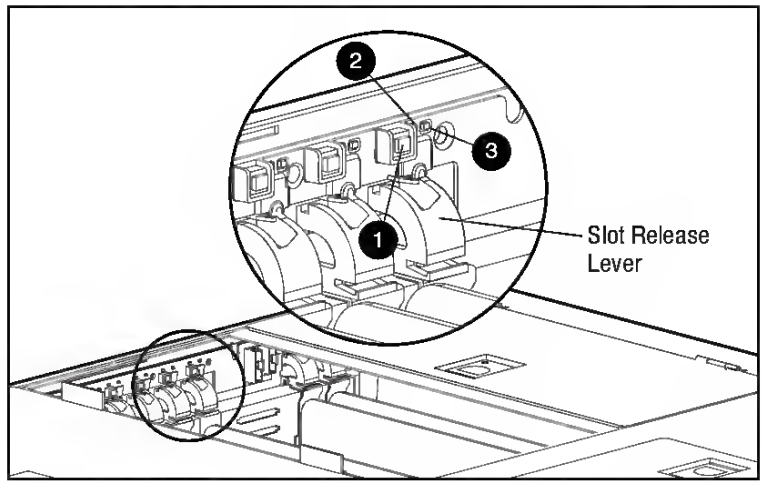

Figure 4-48. Activating the PCI Hot Plug button

10. Check the amber LED ❷ and green LED ❸ for slot status. The green LED will flash during the power up transition and will turn on when power up is complete. For details on PCI Hot Plug LEDs, see "PCI Hot Plug LEDs" earlier in this chapter.

11. Close and lock the PCI Hot Plug access doors.

Removing a Compaq Array Controller with Extended SCSI (PCI Hot Plug Slots 10 and 11)

IMPORTANT: Removing or replacing a nonredundant Compaq array controller with Extended SCSI that manages the server's boot device will force a critical server error.

IMPORTANT: Use the PCI Hot Plug software to disable the slot before the card is removed.

NOTE: If two array controllers with Extended SCSI are installed in Slots 10 and 11 on startup, the controller in Slot 10 is the primary controller. If the controller in Slot 10 fails or is removed, the controller in Slot 11 becomes primary.

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1. Unlock and open the left PCI Hot Plug access door.

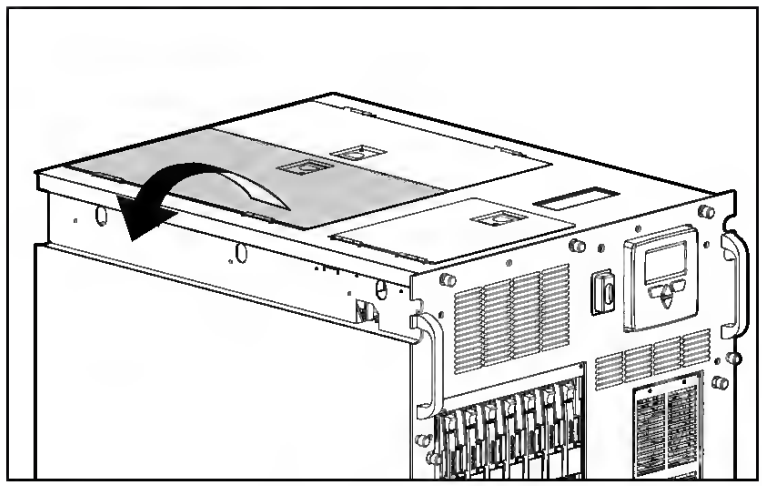

Figure 4-49. Opening the left PCI Hot Plug access door

2. Use the PCI Hot Plug button or software application to turn power off to the slot. The green LED will flash during the power down transition and will turn off when power down is complete. For details on PCI Hot Plug LEDs, see the "PCI Hot Plug LEDs" section earlier in this chapter.

CAUTION: DO NOT open the slot release lever unless the slot's green PCI Hot Plug LED is off. System power down and subsequent data loss could occur.

3. When the slot's green LED is off, open the slot release lever.

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4. Open the ejector handles ❶ and remove the board ❷.

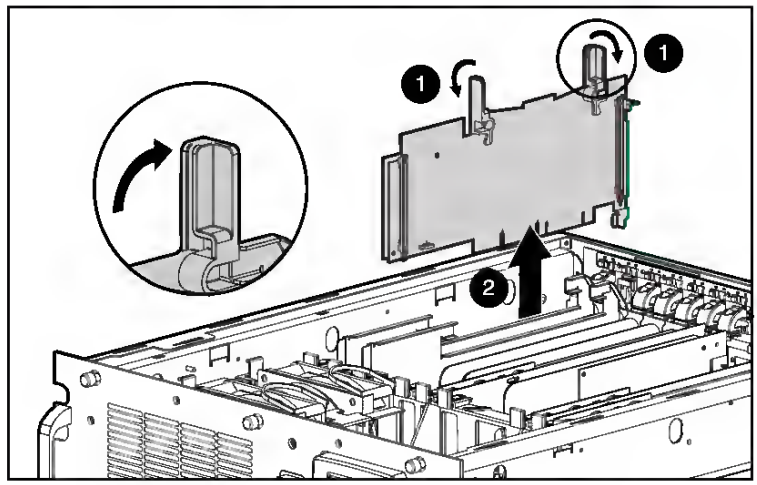

Figure 4-50. Removing the Compaq Array Controller with Extended SCSI

5. Install an expansion slot cover ❶.

6. Close the slot release lever ❷. Make sure that the lever latches into the closed position.

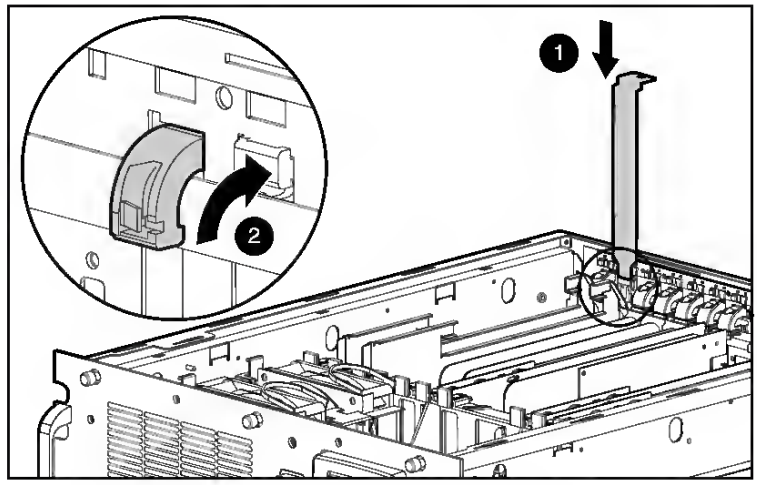

Figure 4-51. Installing an expansion slot cover

7. Close and lock the PCI Hot Plug access doors.

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Adding Compaq Array Controllers with Extended SCSI (PCI Hot Plug Slots 10 and 11)

PCI Hot Plug Slots 10 and I1 on the ProLiant ML750 server I/O board are designed to support Compaq array controllers with Extended SCSI in addition to industry-standard 33-MHz or 66-MHz PCI expansion boards keyed for universal or 3.3-V signaling.

If two Compaq array controllers with Extended SCSI are installed in Slots I0 and I I, the redundant controller will provide protection against failure of the primary controller. The two controllers are connected through the I/O board by the Intercontroller Link.

IMPORTANT: If only one Compaq array controller with Extended SCSI is installed, either Slot 10 or 11 may be used. The remaining slot may be used for industry-standard, 33-MHz or 66-MHz PCI expansion boards with universal or 3.3-V keying.

NOTE: Be sure your operating system supports hot addition. For more details, refer to your operating system documentation.

This procedure for adding a Compaq array controller with Extended SCSI using PCI Hot Plug technology is based on the assumption that the server boot device/array is controlled by a separate controller. Also, the internal drive cages that will be controlled by the Compaq array controller with Extended SCSI must already be cabled for operation. For example, the internal drive cage is cabled to one of the SCSI ports on the I/O board.

1. Unlock and open the left PCI Hot Plug access door on the top access panel. See "Locating the I/O Expansion Slots" earlier in this chapter.

CAUTION: DO NOT open the slot release lever unless the slot's green PCI Hot Plug LED is off. System power down and subsequent data loss could occur.

2. If the slot's PCI Hot Plug green LED is on, use the PCI Hot Plug button or software application to turn power off to the slot. The green LED will flash during the power down transition and will turn off when power down is complete. For details on PCI Hot Plug LEDs, see the "PCI Hot Plug LEDs" section earlier in this chapter.

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3. Press on the top of the appropriate expansion slot release lever ❶ and open the lever toward the rear of the expansion slot ❷.
4. Remove the expansion slot cover ❸. Save the cover for future use.

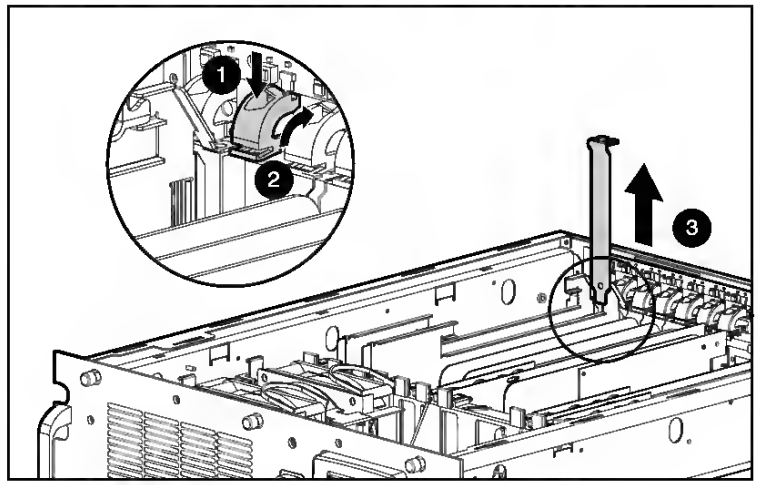

Figure 4-52. Preparing Hot Plug expansion Slot 10 for installation

5. Align the Compaq array controller with Extended SCSI into the Slot 10 or 11 divider alignment guides ❶. Insert the board until it is resting on the top of the slot connector ❷.
6. Secure the board by pushing the ejector levers downward ❸.

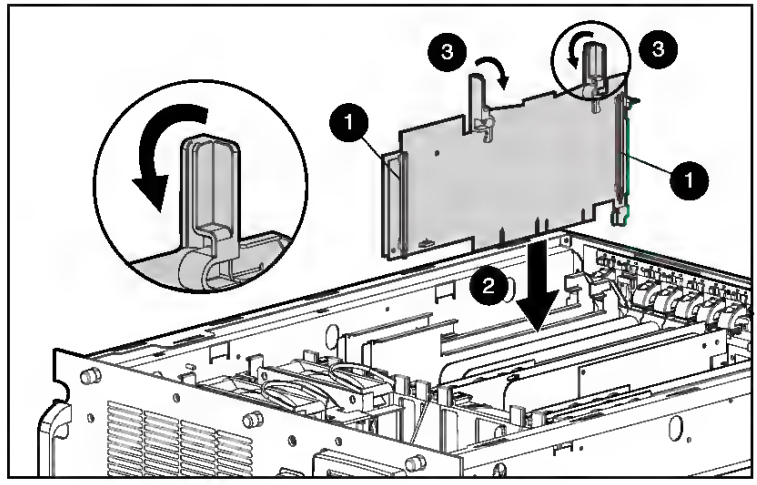

Figure 4-53. Securing expansion board with Extended SCSI

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7. Close the expansion slot release lever from the rear of the unit to secure the board. Make sure the lever latches are in the closed position.

   NOTE: No cable attachment is required.

8. Activate power to the slot through the PCI Hot Plug application or by pressing the PCI Hot Plug button associated with the corresponding PCI slot.
9. Review the slot's LEDs for slot status. The green LED will flash during the power up transition and will stay on when power up is complete. For details on PCI Hot Plug LEDs, see the "PCI Hot Plug LEDs" section earlier in this chapter.
10. Close and lock the PCI Hot Plug access doors.

Non-Hot-Plug Expansion Board Installation

IMPORTANT: If you use a Remote Insight Board/PCI, Compaq recommends that it be installed in Slot 1. If no Remote Insight Board/PCI is to be used with the server, any 32-bit card may be used in Slot 1.

To install a non-hot plug expansion board:

1. If the server is on, place the server in Standby, unplug all power cords, and unlock and open the hot-plug access doors. See Chapter 3, "Server Operation."

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2. Press the top of the release lever ❶ and open the lever toward the rear of the expansion slot cage ❷.
3. Remove the expansion slot cover ❸. Save the cover for future use.

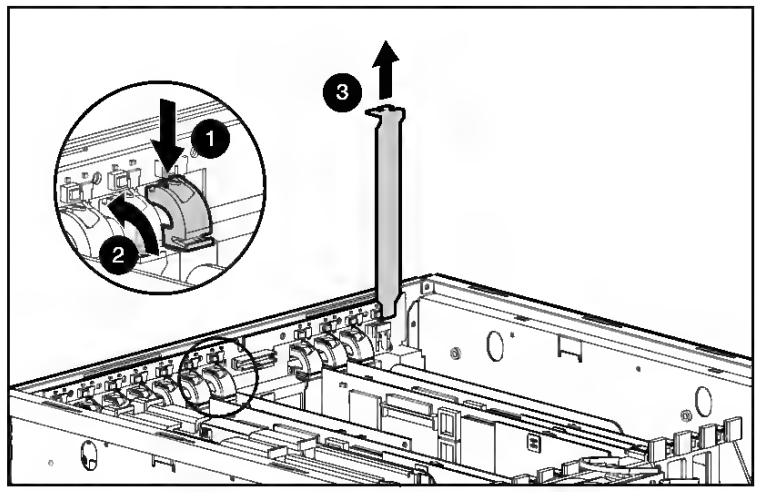

Figure 4-54. Preparing the slot for installation

4. Insert the expansion board into the slot, pushing until securely seated ❶.
5. Close the slot release lever ❷. Ensure that the lever latches into the closed position.

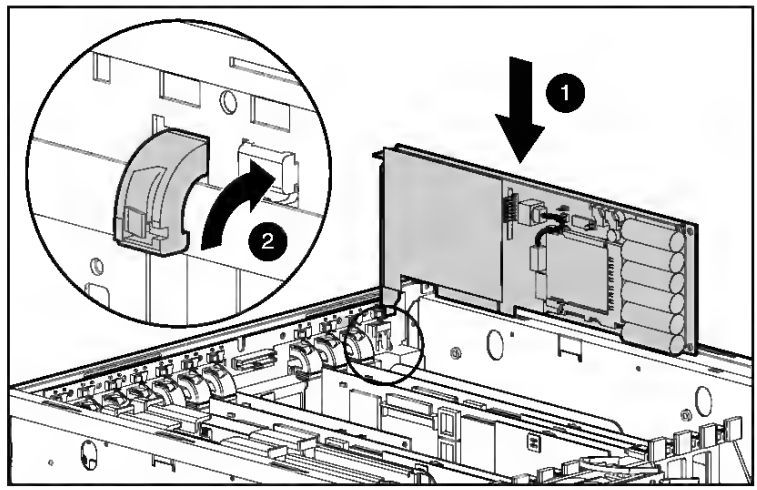

Figure 4-55. Inserting the expansion board

6. Close and lock the hot-plug access doors.

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7. Reconnect all power cords and turn on the server. See Chapter 2, "Server Installation."
8. Install any required software. Refer to your options documentation for more information.
9. To remove an expansion board, reverse steps 1 through 7.

Replacing Fans

The ProLiant ML750 server ships with two hot-plug redundant I/O fans (Fans 1 and 2), two internal processor fans (Fans 4 and 5), and two external hot-plug processor fans (Fans 3 and 6).

Replacing Hot-Plug Redundant I/O Fans (Fans 1 and 2)

CAUTION: Never remove both hot-plug redundant I/O fans while the server is on. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown in the event of overheating.

1. Unlock and open the hot-plug I/O fan access door in the top access panel ❶.
2. Pull the locking latch toward the thumb strap ❷ and lift the failed hot-plug I/O fan (either Fan 1 or Fan 2) out of the fan cage ❸.

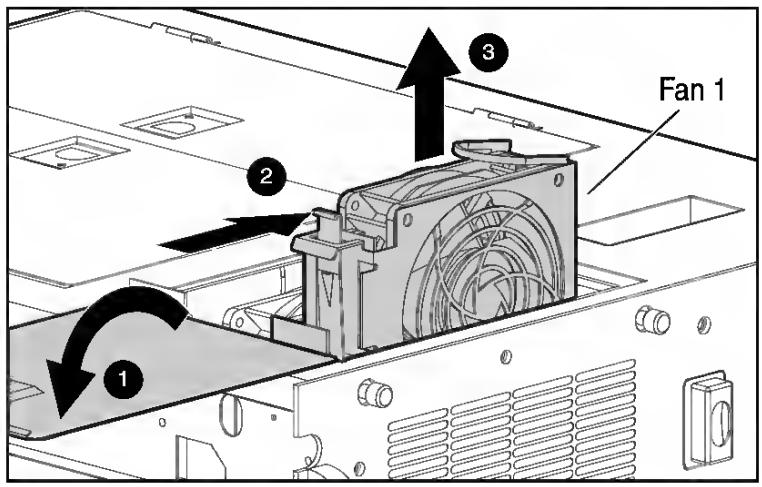

Figure 4-56. Removing a hot-plug redundant I/O Fan (Fan 1)

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3. Lower the new hot-plug I/O fan into the fan cage until it rests on the fan board connector ❶, holding the locking latch ❷ and thumb strap ❸. Push the locking latch and bracket down to engage the fan. Close the fan access door ❹.

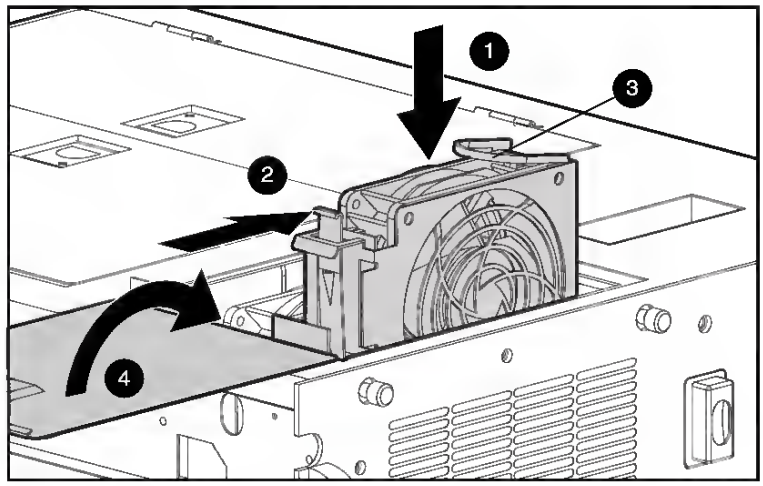

Figure 4-57. Installing a new hot-plug redundant I/O fan

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4. Verify that the fan is producing air flow by interpreting the hot-plug fan LEDs as follows:
   - No light—power is not applied to the fan
   - Green light ❷—power is applied to the fan and the fan is functional
   - Amber light ❶—fan has failed

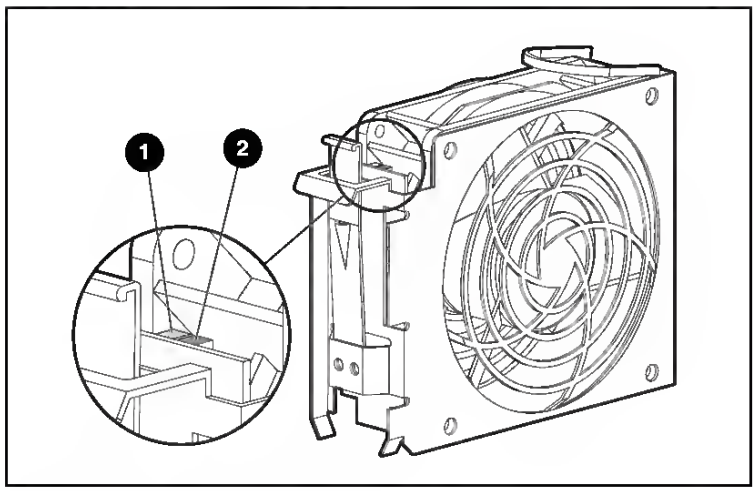

Figure 4-58. Hot-plug I/O fan LEDs

5. Lock the hot-plug I/O fan access door.

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Replacing the Hot-Plug Redundant Front Processor Fans (Fan 3)

WARNING: To reduce the risk of injury or damage to the equipment, do not remove the internal processor fan assembly (Fan 4) while the server is powered up. Fan 4 is NOT hot-plug capable. For information on placing the server in Standby and disconnecting the power cords, see the "Powering Down the Server" section in Chapter 3.

1. Pull the ejector lever out ❶ to release the front processor fans, pivot the fans outward ❷, and remove the fans from the chassis.

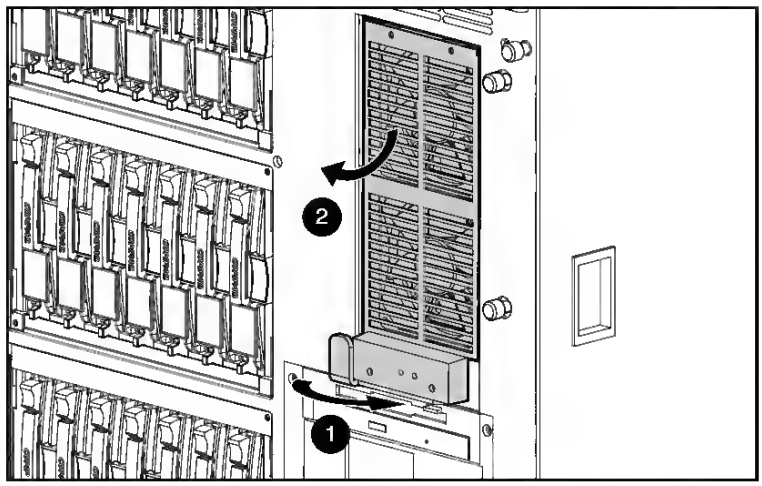

Figure 4-59. Releasing the hot-plug redundant front processor fans from the chassis

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2. Insert the new front processor fan toe locks into the slots at the top of the front internal processor fan assembly (Fan 4) ❶.
3. Pivot the front processor fans into place and secure the fans by closing the ejector lever ❷.

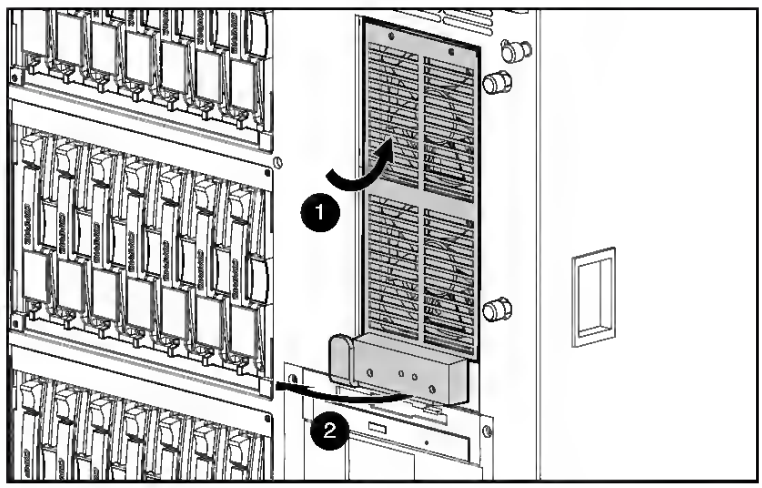

Figure 4-60. Installing the hot-plug redundant front processor fans

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4. Verify that the fans are producing airflow by interpreting the hot-plug fan LEDs as follows:
   - No light—power is not applied to the fan
   - Green light ❶—power is applied to the fan and the fan is functional
   - Amber light ❷—fan has failed

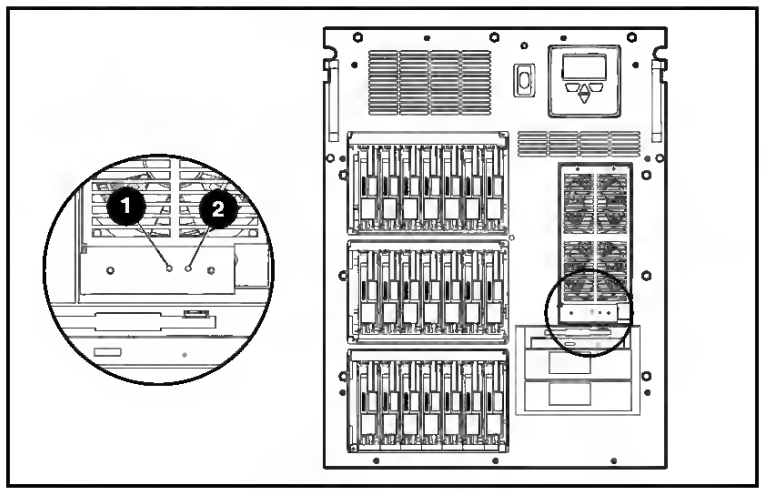

Figure 4-61. Hot-plug redundant front processor fan LEDs

NOTE: After correct installation, the fans will activate and an event message will be displayed on the Integrated Management Display.

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Replacing the Hot-Plug Redundant Rear Processor Fans (Fan 6)

WARNING: To reduce the risk of injury or damage to the equipment, do not remove the internal processor fan assembly (Fan 5) while the server is powered up. Fan 5 is not hot-plug capable. For information on placing the server in Standby and disconnecting the power cords, see the "Powering Down the Server" section in Chapter 3.

1. Turn the thumbscrew counterclockwise to release the rear processor fans ❶, pivot the fans outward ❷, and lift upward to remove ❸.

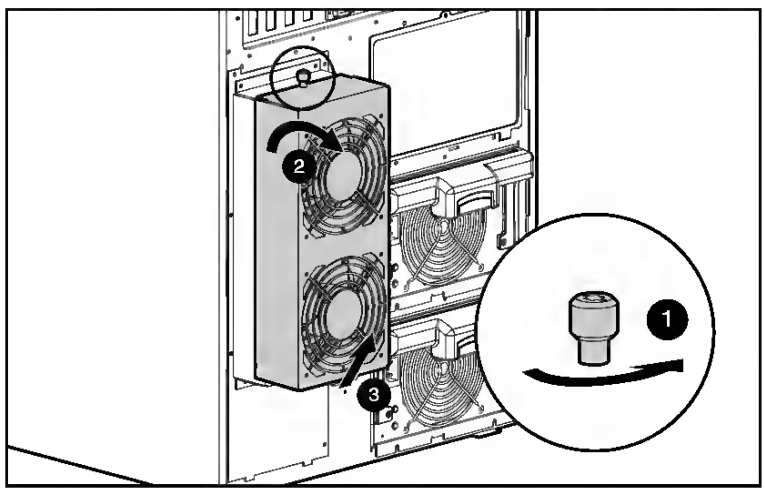

Figure 4-62. Removing the rear processor fans from the chassis

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2. Insert the new rear processor fan toe locks into the slots at the bottom of the rear internal processor fans (Fan 5) ❶.
3. Pivot the rear processor fans into place ❷ and secure with the thumbscrew ❸.

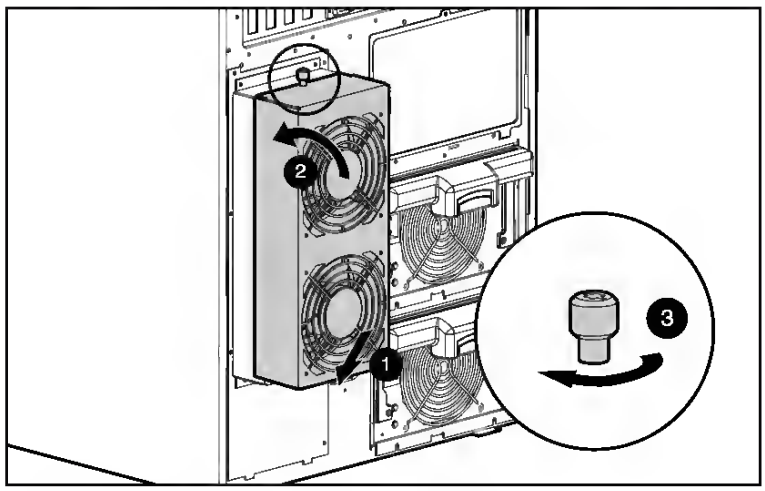

Figure 4-63. Installing the rear processor fans

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4. Verify that the fans are producing air flow by interpreting the hot-plug fan LEDs, located on Fan 6, as follows:

   - No light—power is not applied to the fan
   - Green light ❶—power is applied to the fan and the fan is functional
   - Amber light ❷—fan has failed

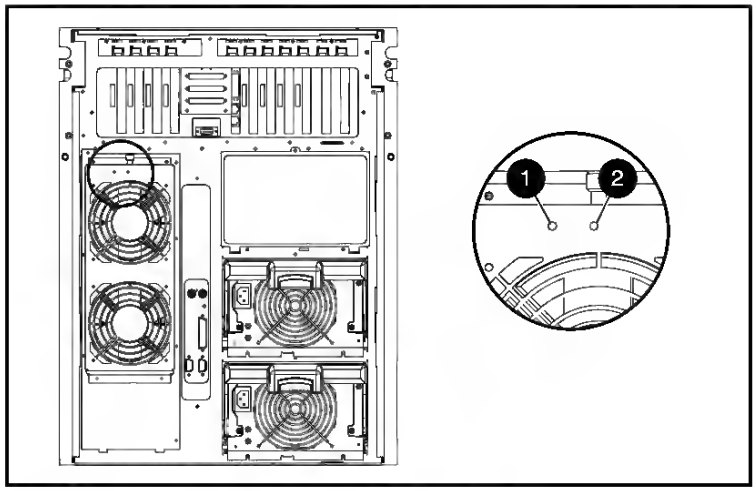

Figure 4-64. Hot-plug redundant front processor fan LEDs

NOTE: Upon correct installation, the fans will activate and an event message will be displayed on the Integrated Management Display.

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Chapter 5

Cabling the Server

ProLiant ML750 Server SCSI Cables

Check the following table to verify that you have all of the necessary items before beginning the installation process. All items are shipped with every ProLiant ML750 server model.

Table 5-1
SCSI Cables Included with the Server

Description	Location
Three (3) 23-inch internal Wide SCSI point-to-point cables	Preinstalled
One (1) 2-device Wide SCSI cable	Preinstalled
One (1) 46-inch internal Wide point-to-point SCSI drive cable	Country kit specific
Three (3) cable clips	Country kit specific

If any of the above referenced items are not included with your ProLiant ML750 server, see the "Getting Help" section at the front of this guide.

NOTE: Detailed cabling information and the internal SCSI cable option kit part numbers for ProLiant ML750 servers are available on the Compaq website:

http://www.compaq.com

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Cabling Guidelines

The following guidelines are provided as an overview for first-time cable connection and installation in ProLiant ML750 servers. If you have any questions, contact your Compaq authorized reseller or access the Compaq website:

http://www.compaq.com

Determining Cabling Needs

To customize the cabling needs of your Compaq ProLiant ML750 server to your specific application, follow the procedure below:

1. Determine whether the cabling needs are internal or external.
2. Determine whether external cabling needs are for primary storage (hard drives) or for secondary storage (DLT drive or DAT drive).
3. Identify the controller type.
4. Identify the drive type, drive cage, and expansion slot to be used.
5. Refer to the appropriate entry of the cabling matrices in the following pages to determine the correct usage and routing of the cables specific to your situation.

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Locating the Expansion Slots

The ProLiant ML750 server I/O board has 11 expansion slots located directly beneath the top access panel. The server supports PCI Hot Plug capability. Access to the PCI Hot Plug–capable expansion slots is through two PCI Hot Plug access doors on the top access panel.

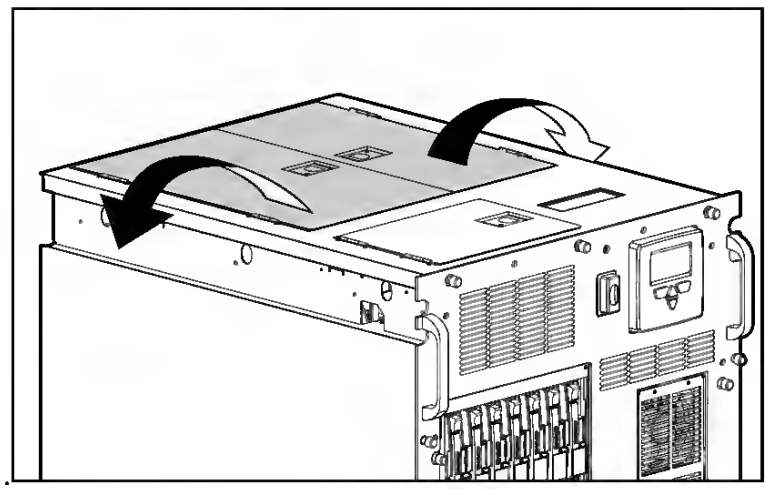

Figure 5-1. Access to expansion slots through PCI Hot Plug access doors

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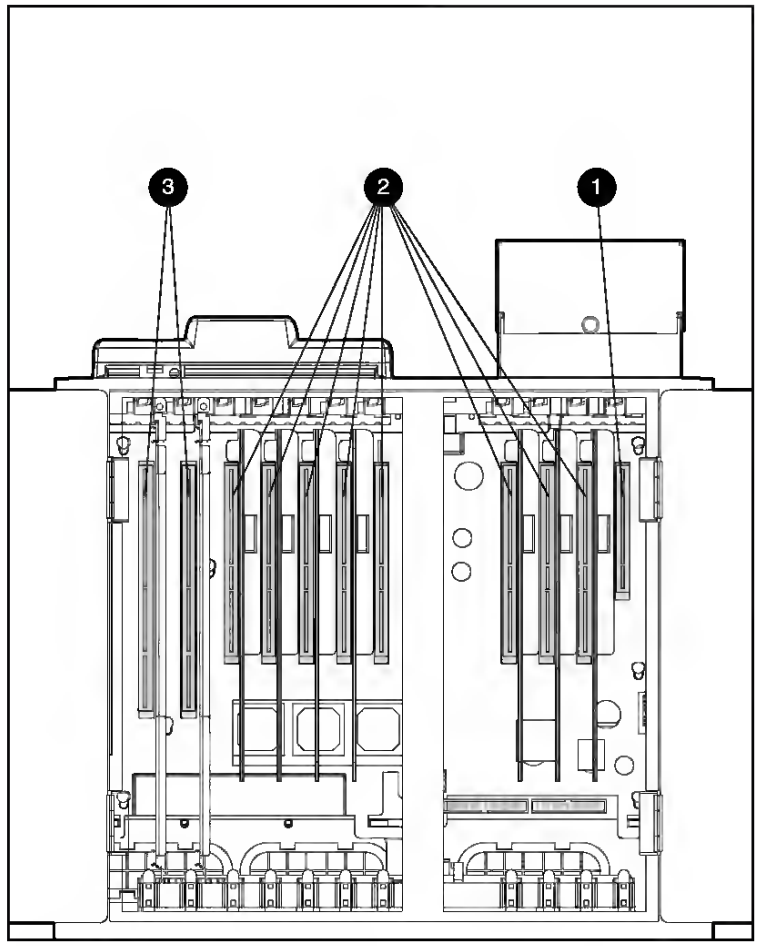

Figure 5-2. Top view of expansion slots

Table 5-2
I/O Slots

ID	Slot Descriptions
❶	32-bit PCI Hot Plug Slot 1
❷	64-bit PCI Hot Plug Slots 2-9
❸	64-bit PCI Hot Plug with Extended SCSI Slots 10-11

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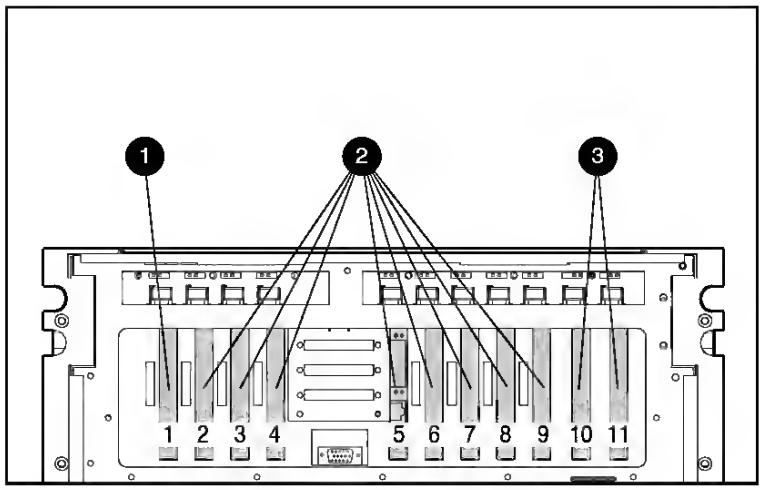

Figure 5-3. Location of expansion slots in rear of server

Table 5-3
I/O Slots

ID	Slot Descriptions
❶	32-bit PCI Hot Plug Slot 1
❷	64-bit PCI Hot Plug Slots 2-9
❸	64-bit PCI Hot Plug with Extended SCSI Slots 10-11

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Supported I/O Expansion Boards

The I/O board of the ProLiant ML750 server has 11 expansion slots. All slots support a variety of industry-standard PCI expansion boards and all are PCI Hot Plug-capable.

IMPORTANT: If you install a Remote Insight Board/PCI, Compaq recommends it be placed in Slot 1. If no Remote Insight Board/PCI is installed, any 32-bit PCI card may be used in Slot 1.

Table 5-4
Supported I/O Expansion Boards

Slot No.	Expansion Board
1	Remote Insight Board/PCI or industry-standard 32-bit 33-MHz PCI board (universal or 5-V keying)
2-4	Industry-standard 32-bit or 64-bit 33-MHz PCI board (universal or 5-V keying)
5	Primary Network Interface Card or industry-standard 32-bit or 64-bit 33-MHz PCI board (universal or 5-V keying)
6-9	Industry Standard 32-bit or 64-bit 33-MHz PCI Board (universal or 5-V keying)
10-11	Compaq Array Controller with Extended SCSI architecture or Industry Standard 66-MHz PCI Board (32-bit or 64-bit, universal or 3.3-V keying)

Note: Slots 10 and 11 are capable of operating at 66-MHz PCI, but the PCI bus will only operate as fast as the slowest card installed in either slot.

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Internal SCSI Connections

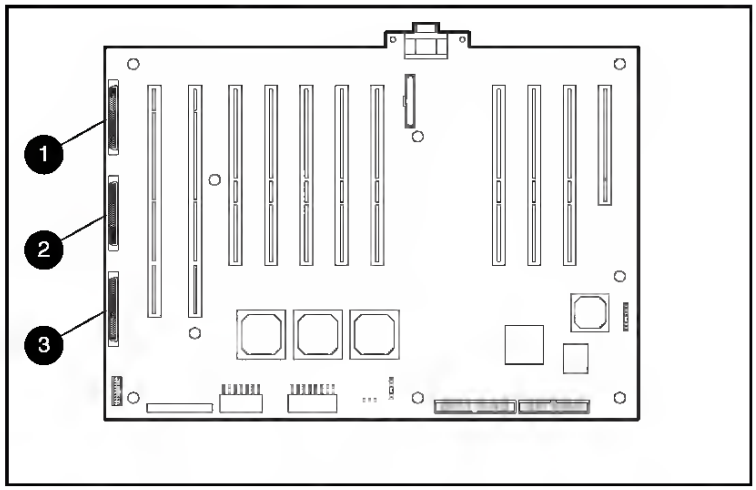

Figure 5-4. Internal SCSI connections on the I/O board

Table 5-5
Internal SCSI Connections

Number	Connection
❶	Slot 10/11 SCSI Port 3
❷	Slot 10/11 SCSI Port 2
❸	Slot 10/11 SCSI Port 1

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Internal Storage Locations

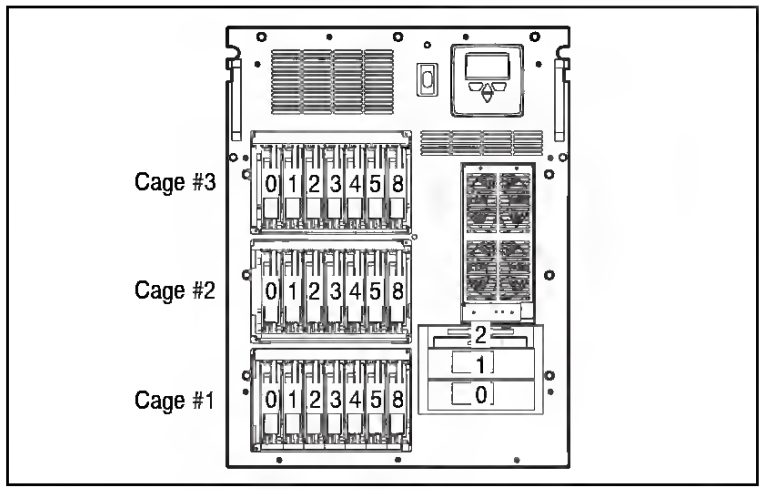

Figure 5-5. Front of server

Cabling with Controller Boards

Use the following matrix as a guide to determine the correct cabling with SCSI controllers. Illustrations and detailed instructions are provided in the "ProLiant ML750 Server Cabling Scenarios" section later in this chapter.

Table 5-6
ProLiant ML750 Cabling Matrix

Controller	Drive Cages #1, #2, & #3: Ultra3 Hard Drives	Removable Media Bays: DLT, DAT Drives
PCI SCSI Controller Board	See Figure 5-6	See Figure 5-7
Compaq Smart Array 3100ES or 4250ES Controller	Cables preinstalled for all drive cages	Not supported
Compaq Smart Array 3200 or 4200 Controller	See Figure 5-8	Not supported

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Duplexing

Internal duplexing in the Compaq ProLiant ML750 servers is accomplished by duplexing one drive cage with another drive cage. You can use a dual-channel PCI SCSI controller board to duplex drive cages in the system.

Duplexing is not supported in the removable media bays or within one drive cage.

External Cabling for Secondary Storage

Use the following matrix as a guide to determine the correct external cabling for secondary storage.

Table 5-7
External Cabling for Secondary Storage Cable Matrix

Controller	20/40 or 35/70 DLT Drive DLT Tape Array I or II 35/70 DLT Library	4/8, or 12/24 DAT Drive 4/8 SLR Drive Internal or External 4/16 TurboDat Autoloader	CD Storage System
Compaq SCSI Controller Card (PCI)	External tape drive systems kit or tape drive option kit includes the external cable for this configuration.	The SCSI Storage Expander II option kit or tape drive option kit includes all necessary cabling for this configuration.	The CD Storage System includes all necessary cabling for this configuration.
Dual-Channel Ultra3 SCSI Controller or Dual-Channel Wide-Ultra SCSI-3 Controller*	■ Order Option Kit 295647-B21 for a 12-ft VHDCI-Narrow cable ■ Order Option Kit 295644-B21 for a 6-ft VHDCI-Wide cable ■ Order Option Kit 295645-B21 for a 12-ft VHDCI-Wide cable ■ Order Option Kit 295646-B21 for 6-ft VHDCI-Narrow cable	■ Order Option Kit 295646-B21 for a 6-ft VHDCI-Narrow cable ■ Order Option Kit 295647-B21 for a 12-ft VHDCI-Narrow cable	Not supported

*The 35/70 DLT Library and 20/40 DLT Drive are not supported with this controller.

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External Cabling for Primary Storage

Use the following matrix as a guide to determine the correct external cabling for primary storage.

Table 5-8
External Cabling for Primary Storage Cable Matrix

Controller	ProLiant Storage System (Model U1, Model U2, or Model UE)
External Ports on Dual-Channel Ultra3 Controller	■ Storage system tower models include an external 6-ft point-to-point Wide SCSI cable ■ Storage system rack models include an external 12-ft point-to-point Wide SCSI cable
External Ports on Smart Array 3200 Controller	■ Order Option Kit 295644-B21 for one 6-ft VHDCI-Wide cable ■ Order Option Kit 295645-B21 for one 12-ft VHDCI-Wide cable
External Ports on Smart Array 4200 Controller	■ Storage system tower models include an external 6-ft point-to-point Wide SCSI cable ■ Storage system rack models include an external 12-ft point-to-point Wide SCSI cable

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Fibre Channel Cabling for Primary Storage

Use the following matrix as a guide to determine the correct cabling for the Fibre Channel Storage System.

Table 5-9
Fibre Channel Storage System Cable Matrix

Controller	Fibre Channel Array Kit	Fibre Channel Host Adapter Kit
External Array Controller	■ Kit includes a 2-m multi-mode Fibre Channel cable OR ■ Order Option Kit 234457-B22 for one 5-m multi-mode Fibre Channel cable ■ Order Option Kit 234457-B23 for one 15-m multi-mode Fibre Channel cable	Not supported
External Port on Fibre Channel Host Adapter/P	Not supported	■ Kit includes an external 5-m multi-mode Fibre Channel cable OR ■ Order Option Kit 234457-B21 for one 2-m multi-mode Fibre Channel cable ■ Order Option Kit 234457-B23 for one 15-m multi-mode Fibre Channel cable

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Preparing for Cable Installation

The Compaq ProLiant ML750 server chassis facilitates the connection of SCSI cables and the installation of hardware upgrades. Use the following information to prepare your ProLiant ML750 server for cable installation.

Tools Needed

- Torx T-15 screwdriver or flat-blade screwdriver
- 3/16-inch nut driver

Preparing the Server

To prepare your ProLiant ML750 server for cable installation, remove the access panels necessary to gain access to the server components you will be cabling.

Access Panels

Use the following table to determine how to access the server components.

Table 5-10
Access to Server Components

To Gain Access To:	You Will Need To:
PCI Hot Plug expansion slots	Open PCI Hot Plug access doors.
I/O board	Remove top access panel.
Hard drive cages	Remove left side access panel.
Removable media bays	Remove removable media frame and right side access panel.

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For instructions on removing the top access panel, the right side access panel, and the left side access panel, see Chapter 3, "Server Operation."

WARNING: To reduce the risk of personal injury, disconnect all power cords and unplug any telecommunications cables before removing any access panels.

- Disconnect the power cord to avoid exposure to hazardous energy levels that may cause burns when parts are short-circuited by metal objects such as tools or jewelry.
- Disconnect telephone cables to avoid exposure to shock hazard from telephone ringing voltages.

CAUTION: Never operate the server with an access panel removed or partially installed. Doing so could cause thermal damage to the hard drives or system and could void your server warranty.

ProLiant ML750 Server Cabling Scenarios

IMPORTANT: To preserve data integrity, Compaq recommends the use of Compaq SCSI cables. If the cables are ever damaged, replace them with identical Compaq parts. SCSI data transfers will operate poorly or not at all when signal conditions are degraded due to low-quality cables.

The following illustrations are provided only as an overview for installing and routing some of the cabling scenarios described in the cabling matrix earlier in the chapter. If you have any questions, contact your local Compaq authorized reseller or service provider.

NOTE: Part numbers are stamped on all cables.

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Connecting the PCI SCSI Controller Board to the Drive Cage

CAUTION: Improperly routed and dressed SCSI cables can block system airflow and cause component overheating. Route cables according to the figures provided in this manual. Dress cables with clips provided with the server.

IMPORTANT: PCI Hot Plug operations are easier to perform if:

- Internal cables are not routed across the top of adjacent expansion boards, or
- Cables have adequate service loops to permit expansion board removal and insertion.

Use the 46-inch cable to connect the PCI SCSI controller board to drive cage 1, 2, or 3 as shown in Figure 5-6. Attach one end of the cable to the 68-pin connector on the PCI SCSI controller board. Fold and route the cable up the length of the board to the expansion board guide ❶, across the top of the guide, and down through the appropriate cable channel ❷. Position the cable to prevent blocking I/O fan exhaust air.

Attach the other end of the cable to the preferred drive cage.

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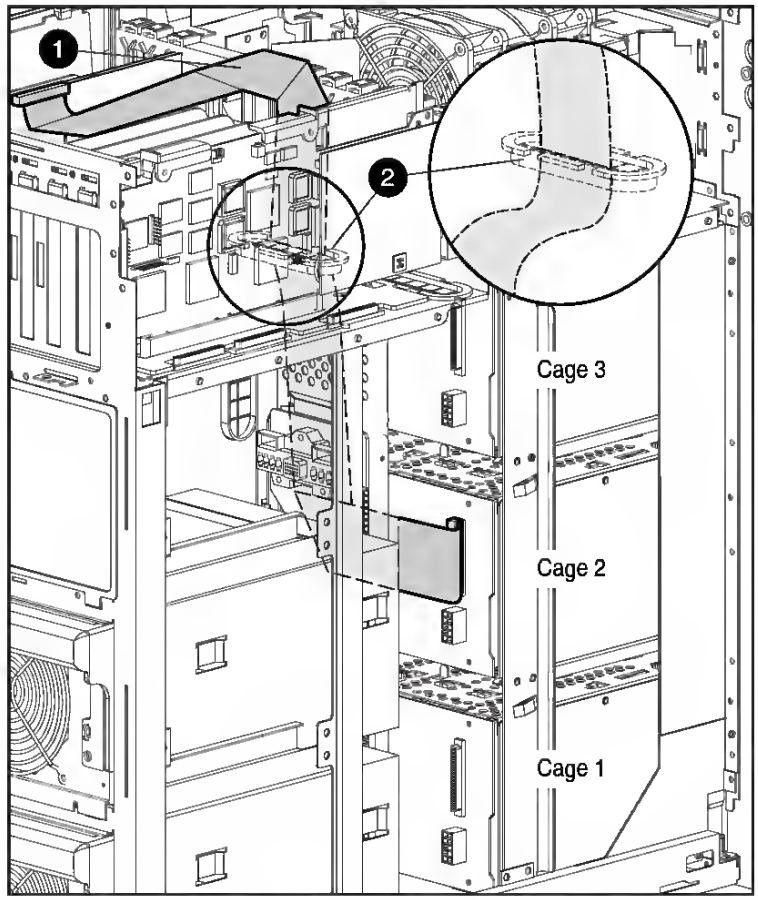

Figure 5-6. Connecting the PCI SCSI controller board to drive cage 1, 2, or 3

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Connecting the PCI SCSI Controller Board to the Removable Media Bays

Locate the two-device wide SCSI cable packaged at the bottom of the removable media cage in your server. Follow the instructions below to cable a 35/70 DLT Drive, a 20/40 DLT Drive, or a DAT Drive in a removable media bay.

> **NOTE:** It may be necessary to connect the 68-50 pin adapter (supplied with the removable media) to the device to complete the cabling.

Attach one end of the two-device cable to a PCI SCSI Controller board in Slot 5 through Slot 9. Attach the other end of the cable to the preferred SCSI media device.

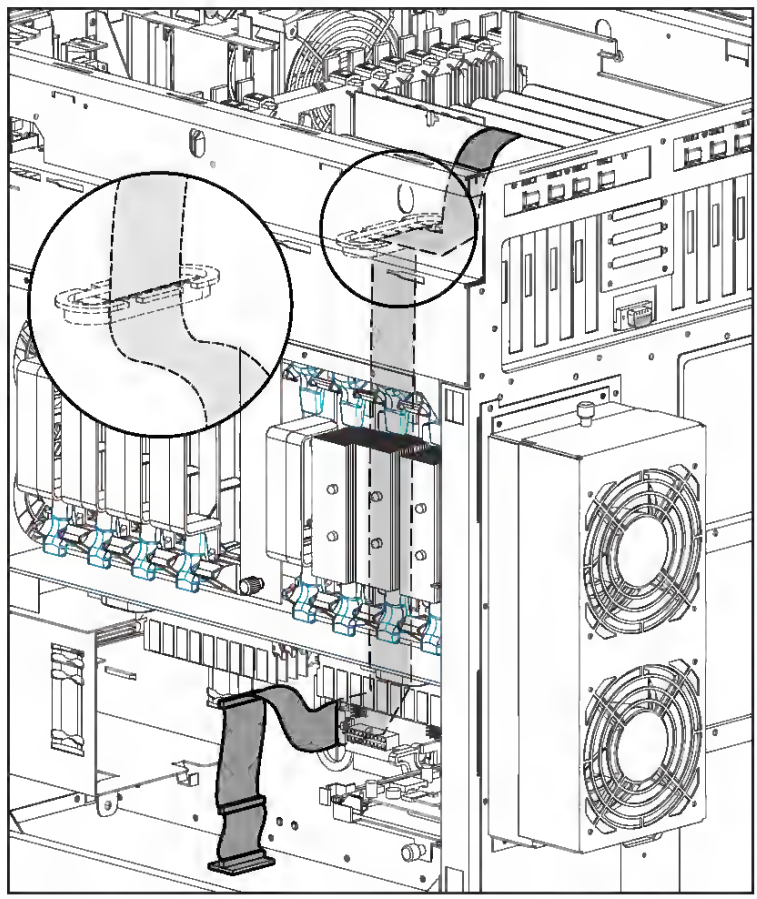

Figure 5-7. Connecting the PCI SCSI Controller Board to removable media bays

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Connecting the Smart Array 3200 or 4200 Controller to the Drive Cage

Compaq recommends using the Smart Array 4250ES or another array controller with Extended SCSI to control internal drive cages. The array controllers with Extended SCSI have three channels to support all drive cages. Also, there are no cables attached to the card, which simplifies insertion and removal.

This section is provided if you decide to use the Smart Array 3200 or 4200 Controller for internal drive cages.

CAUTION: Improperly routed and dressed SCSI cables can block system airflow and cause component overheating. Route cables according to the figures provided in this manual. Dress cables with clips provided with the server.

IMPORTANT: PCI Hot Plug operations are easier to perform if:

- Internal cables are not routed across the top of adjacent expansion boards, or
- Cables have adequate service loops to permit expansion board removal and insertion.

Use the 46-inch cable to connect the Smart Array 3200 or 4200 Controller to drive cage 1, 2, or 3 as shown in Figure 5-8. Attach one end of the cable to the 68-pin connector on the expansion board.

Fold and route the cable up the length of the board to the expansion board guide ❶, across the top of the guide, and down through the appropriate cable channel ❷. Position the cable to prevent blocking I/O fan exhaust air.

Attach the other end of the cable to the preferred drive cage.

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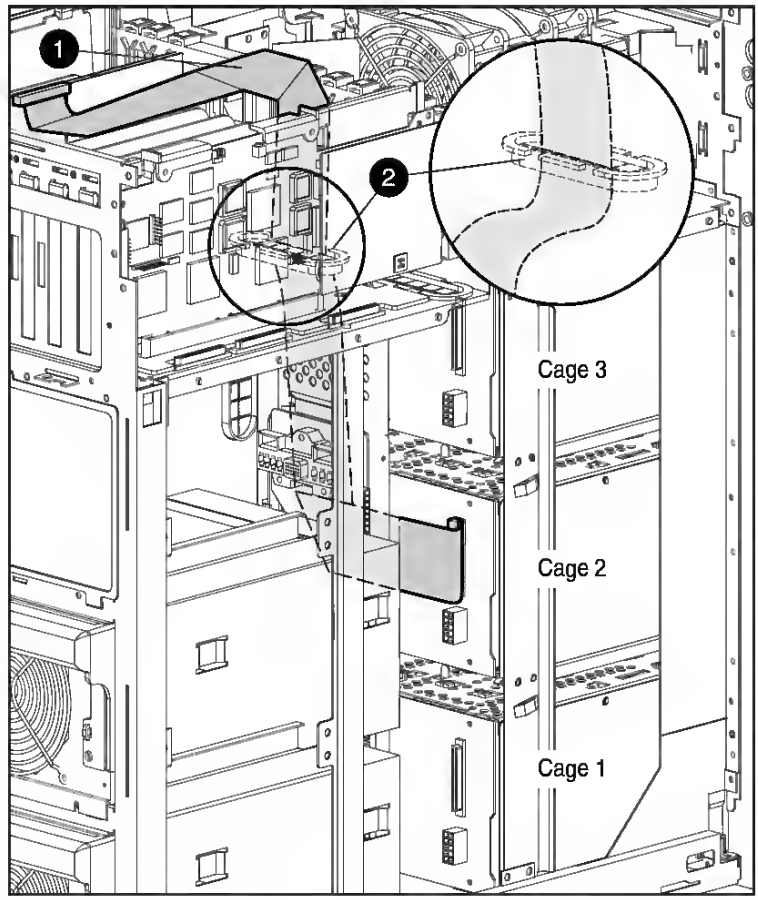

Figure 5-8. Connecting the Smart Array 3200 or 4200 Controller to drive cage 1, 2, or 3

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External Cabling

This server does not contain integrated SCSI ports. PCI SCSI controller boards or array controllers must be used for connecting to optional external mass storage devices. You can connect the server to external devices using the external ports on PCI SCSI controller boards or Dual-Channel Ultra2 Controllers. Smart Array 4200 Array Controllers, Smart Array 3200 Controllers, or other SCSI array controllers may also be used to connect the server to external devices by using the external port on the controller. Fibre Channel devices are connected directly from the controller to the Fibre Channel device.

To install an external storage device, refer to the installation documentation that came with the device. The following procedure provides an overview of this installation.

1. If the server is on, place the server in Standby and disconnect the power cords.
2. If the external storage device is on, turn it off and disconnect the power.
3. Connect one end of the cable to the appropriate controller board installed in the server.
4. Connect the other end of the cable to the appropriate external connector on the rear panel of the external storage device.

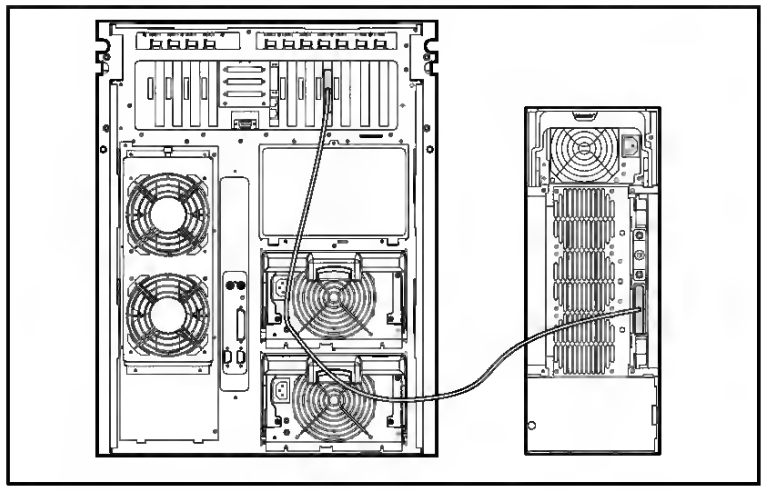

Figure 5-9. Connecting the external mass storage device to Slot 8

5. To configure the device, run the ROM-Based Setup Utility.

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Completing the Installation Process

See Chapter 6, "Configuring the Server," to complete the configuration process using the Compaq SmartStart and Support Software CD.

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Chapter 6

Configuring the Server

If your server has a factory-installed operating system, configure it using the instructions in the following section. Otherwise, follow the instructions in the "Operating System Purchased Separately" section later in this chapter.

NOTE: In this chapter, configuring the server means creating partitions on the hard drive, installing Compaq utilities, and installing the operating system.

Compaq ROM Based Setup Utility

The Compaq ROM based Setup Utility (RBSU) will automatically configure the system based on the operating system selected. RBSU supports a wide range of configuration customization features, including the following:

- Selection of a primary operating system from a list of supported operating systems
- Selection of a Primary Boot Controller from a list of Mass Storage Devices installed.
- Configuration of embedded system devices such as serial, printer, and mouse ports
- Configuration of standard interrupts (IRQs) for PCI devices
- Setting of the date and time
- Configuration of the IMD and system asset text

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- Automatic resolution of resource conflicts in areas such as port addresses and interrupts (IRQs)
- Storage of configuration in non-volatile memory

RBSU comes preinstalled in the system ROM embedded on the server. It has embedded support for English, French, German, Italian, Spanish, and Japanese languages.

NOTE: For additional information on using RBSU refer to the *Compaq ROM Based Setup Utility User Guide*.

Operating System Factory Installed

If you ordered your server with the operating system factory installed, your server is preconfigured with your chosen operating system. Everything required to install your operating system is already on the server but you will still need to complete some configuration tasks. Refer to the *Compaq Factory-Installed Operating System Software User Guide* for further instructions.

1. Power on the server and follow the screen prompts.
2. Refer to the *Compaq Factory-Installed Operating System Software User Guide* for information about installing the Compaq Server Management Agents for your operating system.
3. After verifying that your server configuration is correct, back up your server.
4. Install any application software.

CAUTION: Use the SmartStart and Support Software CD as recovery software only. Booting the server from the SmartStart and Support Software CD could reconfigure the system and may result in all data on the server being erased.

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Operating System Purchased Separately

If you purchased the operating system separately, you will need to configure the server and install the operating system using the SmartStart and Support Software CD.

NOTE: If you do not use the SmartStart and Support Software CD, see the Compaq Array Controller Driver Installation kit for your boot device drivers.

SmartStart is the recommended way to configure the server and to load the system software, thereby achieving a well-integrated server that ensures maximum dependability and supportability.

To install the SmartStart and Support Software CD:

1. With your server turned on, locate the CD-ROM drive.
2. Push the button to release the tray. Pull out the tray.

   Place the SmartStart and Support Software CD in the tray (label facing up), handling the CD from the edges, not by the flat surfaces of the disc.
3. Reboot your server from the SmartStart and Support Software CD.
4. Follow the screen prompts.
5. Install Compaq Insight Manager when prompted by SmartStart.

When the CD-ROM busy LED indicator is lit, the SmartStart installation sequence begins.

The first time the server is configured, the SmartStart program automatically creates a system partition and installs the Compaq utilities in that partition.

NOTE: Refer to the Server Setup and Management pack for instructions on using SmartStart.

NOTE: To manage the system, refer to the Compaq Management CD provided in the Server Setup and Management pack shipped with your server.

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Chapter 7

Integrated Management Log

The Compaq Integrated Management Log records system events and stores them in an easily viewable form. The Integrated Management Log (IML) provides greater serviceability to your Compaq server by being capable of recording hundreds of events when service is required. It also marks each event with a time stamp with one-minute granularity.

Events listed in the IML are categorized as one of four event severity levels:

- Status/Informational—indicates that the message is informational only.
- Repaired—indicates that corrective action has been taken.
- Caution—indicates a non-fatal error condition.
- Critical—indicates a component failure.

The IML requires the use of Compaq operating system–dependent drivers for full support. Refer to the Compaq SmartStart and Support Software CD for instructions on installing the appropriate drivers.

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Multiple Ways of Viewing the Log

You can view an event in the IML in four ways:

- From the Integrated Management Display (IMD)
- From within Compaq Insight Manager
- From within Compaq Survey Utility
- From online operating system utilities

NOTE: You can only **view** the event list on the IMD; you cannot print it. Also, events are shown in a shorter form on the display than in Compaq Insight Manager.

Integrated Management Display

The Compaq Integrated Management Display (IMD) is an integrated 16 × 4 character display mounted on the front of the server. This display provides easy-to-use, menu-driven access to server information. The following sections provide information on configuring, navigating, and using the IMD menus.

Configuring the Integrated Management Display

The IMD can be configured to display a variety of menus that you can customize to meet your specific needs. This section describes how to configure and customize the IMD.

Setup with the ROM-Based Setup Utility

After installing the IMD hardware, use the ROM-Based Setup Utility located on the Compaq SmartStart and Support Software CD to configure the IMD. This version of the utility is the latest one that supports your new IMD.

NOTE: Some operating systems allow the online IMD configuration. Refer to the Support Software CD for more information. The Windows NT utility to set up the IMD is called the Compaq IMD Utility.

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To run the ROM-Based Setup Utility:

1. Boot the computer from the Compaq SmartStart and Support Software CD.
2. From the Compaq System Utilities screen, select Run ROM-Based Setup Utility.
3. Select Continue.
4. Select Review or Modify Hardware Settings and press **Enter.**
5. Select Step 3: View or Edit Details and press **Enter.**
6. Scroll down until you find the section entitled Embedded Compaq IMD Module.
7. Highlight the field to be modified. You must press **Enter** to edit the highlighted item, then type the text for that field. After entering the text, press **Enter** to accept the modifications. Each field is discussed in detail in the "Customizing Management Display Fields" section.
8. Repeat step 7 for each menu item to be modified.
9. Press **F10** to exit the View or Edit Details screen.
10. Select Step 5: Save and Exit.
11. At the server prompt to Save the Configuration and Restart the Computer, select **OK=Enter.** The changes you have entered will not be displayed on the Display Panel until you reboot the computer. Standard IMD fields are defined in the "Navigating the Menus" section later in this chapter.
12. If you have an older version of the ROM-Based Setup Utility installed on your hard drive, you will be asked if you would like to upgrade your system partition. You should upgrade your ROM-Based Setup Utility at this time.

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Setup Using the Compaq Integrated Management Display Utility

After installing the hardware and software, you need to configure the IMD using the Compaq Integrated Management Display Utility.

To run the Compaq Integrated Management Display Utility:

1. Boot the computer and log on to the system as Administrator or a user with administrator privileges.
2. Select Start, Programs, Compaq System Tools, Compaq Integrated Management Display Utility.
3. Select the Field box and click on the down arrow to bring up a pull down selection of the various fields of the IMD to edit.
4. Select Idle Screen. You have three lines of information that can be displayed on the IMD.
5. To change the value in line 1, line 2, and line 3, click on the arrow to the right of the line.
6. Select Save to finish editing. This will save your changes and update the IMD.
7. Select Exit to return to the system.

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Customizing Management Display Fields

You can customize many of the fields shown on the IMD. The following sections define each of the menu choices and include examples of some fields.

Idle Screen Text

After the display has been idle for five minutes, the IMD shows the default screen text in Figure 7-1.

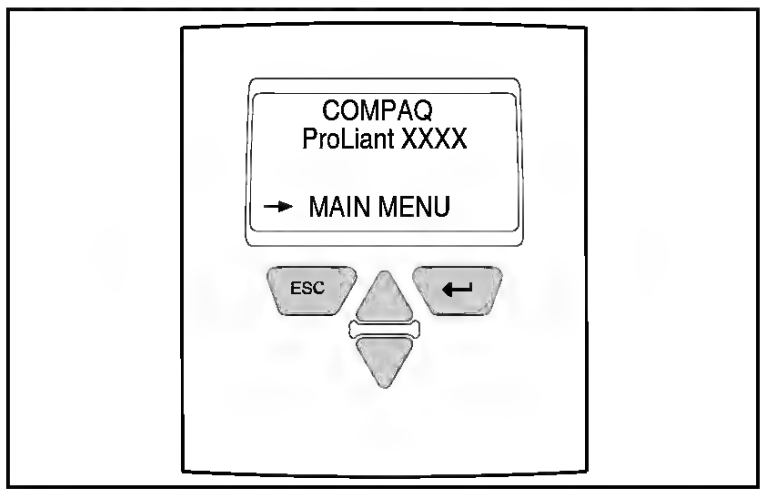

Figure 7-1. Idle screen text

You can change this text by entering up to 3 lines, with no more than 16 characters on each line. For example, enter the server name here. This would allow an administrator to walk into a room with multiple servers and immediately locate the desired server.

Or, put the company name and slogan or goal, such as:

SMITH & ASSOC
OVER 1 BILLION
IN SALES 1999

Custom Menu Item

Custom menu item is a user-defined field that can be used for customizing your server. This one-line field can hold up to 14 characters. If text is entered in this field, the text appears as another choice in the main menu.

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Custom Menu Screen

Custom menu screen is a user-defined field that can be used for customizing your server. You can enter up to 4 lines of 14 characters each.

Server Information

Server Name

Enter up to 2 lines of no more than 14 characters each. For example, to name the server by department, type:

CUST SERVICE
WESTERN REGION

NOTE: The Server Name cannot be changed in the Compaq Integrated Management Display Utility.

Server Asset Tag

Enter the server asset tag. Enter up to 2 lines of 16 characters each.

Primary Operating System

Enter the primary operating system of the server, for example, NT 4.0. You can enter up to 3 lines of 14 characters each.

NOTE: The Primary Operating System cannot be changed in the Compaq Integrated Management Display Utility.

Server Other

Enter any additional information about the server that might be helpful. This field can hold up to 2 lines of 14 characters each. For example, enter the server serial number in this field.

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Administrator Information

Administrator Name

The administrator name field contains the name of the system administrator. You can enter up to 2 lines of no more than 14 characters each.

Administrator Phone Number

The administrator phone number field contains the phone number of the system administrator. Enter up to 2 lines of no more than 14 characters each.

Administrator Pager Number

The administrator pager number field contains the pager number of the system administrator. Enter up to 2 lines of no more than 14 characters each.

Administrator Other

This is a user-defined field. You can enter any additional administrator information, such as the name of an additional administrator who serves as a backup to the primary administrator. Enter up to 2 lines of no more than 14 characters each.

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Service Information

Service Contact Name

The service contact name field contains the name of the service provider. Enter up to 2 lines of no more than 14 characters each.

Service Contact Phone Number

The service contact phone number field contains the phone number of the service provider. Enter up to 2 lines of no more than 14 characters each.

Service Contact Pager Number

The service contact pager number field contains the pager number of the service provider. Enter up to 2 lines of no more than 14 characters each.

Service Contact Other

This is a user-defined field. You can enter any additional service information, such as the service contract number. Enter up to 2 lines of no more than 14 characters each. For example, enter server history information such as:

```
SERVICE CONTRACT
1C2002
```

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Standard Integrated Management Display Fields

In addition to the user-defined fields customized during configuration, the IMD automatically provides the following standard fields.

System Information

Events

Selecting this menu choice enables you to scroll through a list of all error events starting with the most recent event.

ROM Date

The ROM date is the month, date, and year of the current server ROM.

Bootblock Date

The Bootblock date is the month/date/year of the current server Bootblock.

Memory

The memory field shows the total memory of the server.

Processor Configuration

The processor configuration field shows the processor speed and other details about the processor.

F1 Prompt

Selecting this menu choice enables you to continue booting without a keyboard or monitor. This feature is useful for service and diagnostic purposes, allowing you to continue the bootup process without attaching a monitor and keyboard and their respective cables.

Contrast

You can adjust the level of contrast on the display by using the **Up** and **Down** arrows. Press the **Up** arrow to increase the contrast and the **Down** arrow to decrease the contrast.

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Navigating the Menus

The Compaq IMD is menu-driven and easy to use. This section provides information on how to navigate and use the menus.

Normal Run-Time Behavior

After configuring the display and rebooting the server, a series of server POST operations appears. The first screen you will see after rebooting the server shows the model number and IMD firmware revision of your display, then the POST screen appears.

During POST, a spinning bar beside the menu item indicates that the server test is in progress. When the test is finished, the IMD shows a check mark by the completed menu item. A check mark tells you the test is complete but does not necessarily mean the test was error free.

If an error occurs during POST, the server logs the error to the IMD under Unviewed Events and requires you to view the error before proceeding to any other menu choices. If there are no errors, you will see the default idle screen text, as shown in Figure 7-1. This screen could be different if the text was changed during configuration.

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Display Symbols

There are three display symbols used to indicate your menu options. These symbols are the **Up**, **Down**, and **Selector** arrows.

Table 7-1
Integrated Management Display Symbols

Type of Symbol	Symbol	Meaning
Right Arrow	→	Selector arrow shows the current menu item. Press **Enter** on the IMD to select the menu item to the right of this arrow.
Up Arrow	↑	If present in the upper right corner, arrow indicates previous information exists. Press the **Up** Arrow on the IMD to view the information. Press and hold the **Up** and **Down** arrow keys to scroll.
Down Arrow	↓	If present in the lower right corner, indicates more information exists. Press the **Down** Arrow on the IMD to view the information. Press and hold the **Up** and **Down** arrow keys to scroll.

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Navigation

To navigate through the menus, use the four buttons shown in the Figure 7-2. The up ❸ and down ❷ arrow keys and allow you to move through the menu screens and choose menu items. The right button ❹ acts as an Enter key and allows you to travel down through the menus. The left button ❶ acts as an Escape key and allows you to travel back up the menu.

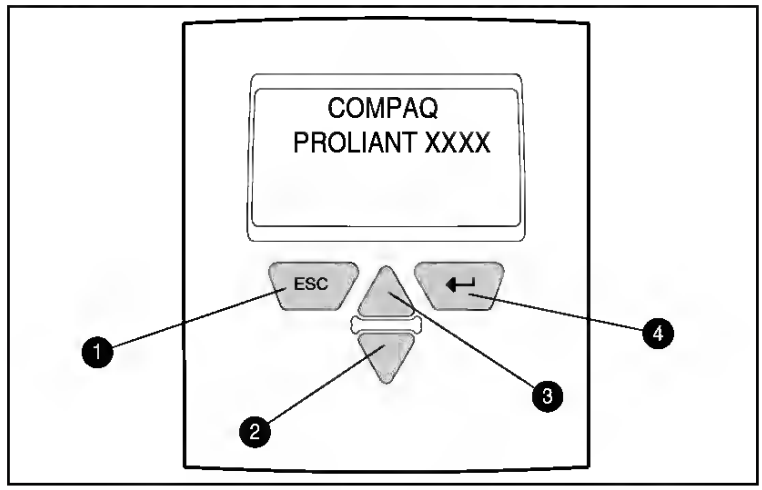

Figure 7-2. Integrated Management Display buttons

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System Behavior with Error Events

If there is an F1 error condition, after system POST, the IMD flashes the message displayed in Figure 7-3.

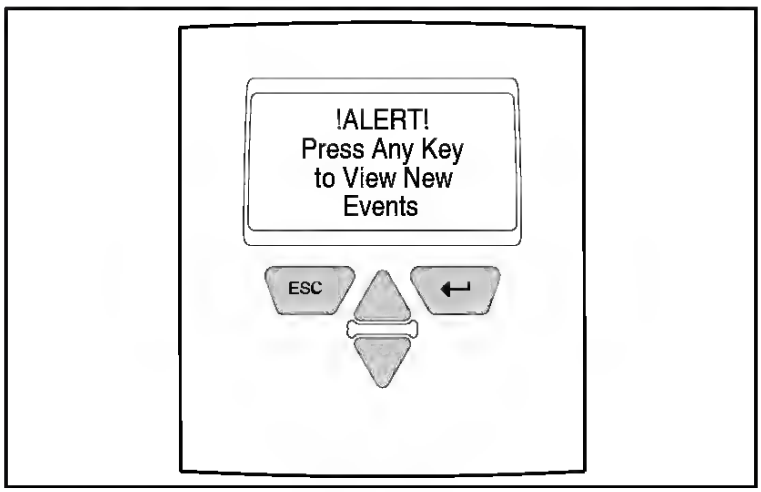

Figure 7-3. New event message

At this point, you must scroll through each screen of the event information menu before the IMD will allow you to move on to other menu choices. The display will not allow you to escape out of the Unviewed Events section until you have examined all of the information stored there.

After you have reviewed the events, you can proceed with normal display operation.

Menu Structure

The following outline shows the structure of each menu and submenu in the order in which it appears:

Events

- Event List

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Administration Information

- Server Information
  - Server Name
  - Server Asset Tag
  - Primary Operating System
  - Server Other
- Administrator Information
  - Administrator Name
  - Administrator Phone Number
  - Administrator Pager Number
  - Administrator Other
- Service Information
  - Service Contact Name
  - Service Contact Phone Number
  - Service Contact Pager Number
  - Service Contact Other
- Custom Menu Item (if entered)
- Custom Menu Screen (if entered)

System Information

- ROM Date
- Bootblock Date
- Memory
- Processor Configuration

Contrast

- Contrast

Other Info

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Compaq Insight Manager

Compaq Insight Manager is a server management tool capable of in-depth fault, configuration, and performance monitoring of hundreds of Compaq servers from a single management console. System parameters that are monitored describe the status of all key server components.

By being able to view the events that may occur to these components, you can take immediate action. You can view and print the event list from within Compaq Insight Manager by following the instructions below. You can also mark a critical or caution event as repaired after the affected component has been replaced. For example, a fan that has failed has been replaced. By marking the entry as repaired, you can lower the severity of the event.

Viewing the Event List

To view the event list:

1. From Compaq Insight Manager, select the appropriate server then select View Device Data.
2. The selected server is displayed with buttons around its perimeter.
3. Select Recovery.
4. Select Integrated Management Log.

   NOTE: The list can only be viewed from the Recovery/Integrated Management Log screen. To print the list, follow the instructions in "Printing the Event List."

5. If a failed component has been replaced, select the event from the list then select Mark Repaired.

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Printing the Event List

You can only view the list from the Recovery/Integrated Management Log screen as described above. To print the list, follow the instructions below.

1. From the Insight Manager, select the appropriate server.

   The selected server is displayed with buttons around its perimeter.

2. Select Configuration.
3. Select Recovery.
4. Select Print.

Compaq Survey Utility

The Compaq Survey Utility is a serviceability tool for Windows 2000, Windows NT, SCO UnixWare, and Novell NetWare that captures online configuration and comparison information to maximize server availability. The utility is available on the Compaq Management CD in the SmartStart package, or on the Compaq website:

http://www.compaq.com

NOTE: Refer to the Compaq Management CD for information on installing and running the Survey Utility.

After the Survey Utility is run, you can view the IML by loading the utility output (typically called *SURVEY.TXT*) into a text viewer such as Microsoft Notepad. The event list follows the system slot information. Once you have opened the text file, you can print it using the print feature of the viewer. For more information on the List of Events, refer to the *Compaq ProLiant Servers Troubleshooting Guide* located on the Compaq Server Documentation CD.

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Appendix A

Regulatory Compliance Notices

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your ProLiant ML750 server is assigned a Compaq series number. The Compaq series number for this product is: Series ES2001. The ProLiant ML750 server series number can be found on the product label, along with the required approval markings and information. See the "Regulatory Compliance Label Location" section later in this chapter to locate the label. When requesting certification information for this product, always refer to this series number. This series number should not be confused with the marketing name or model number for your ProLiant ML750 server.

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Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.)

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC 1D on the label. Once the class of the device is determined, refer to the following corresponding statement.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

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Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of Conformity for Products Marked with the FCC logo—United States Only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

or call 1-800- 652-6672 (1-800-OK COMPAQ). (For continuous quality improvement, calls may be recorded or monitored.)

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For questions regarding this FCC declaration, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 510101
Houston, Texas 77269-2000

or call (281) 514-3333.

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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Mouse Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN55024 (IEC61000-4-2,3,4,5,6,8,11) - Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker
- EN60950 (IEC950) - Product Safety

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Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

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Taiwanese Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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Regulatory Compliance Label Location

The Regulatory Compliance label for your ProLiant ML750 server is located inside the right side access panel near the front processor fans as shown in the figure below. To view this information, remove the right side access panel.

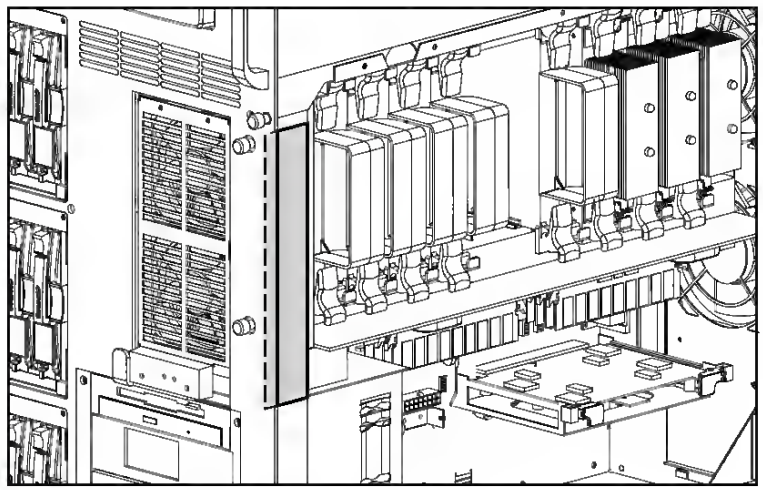

Figure A-1. Location of Regulatory Compliance label

Laser Devices

All Compaq systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.

Laser Safety Warnings

WARNING: To reduce the risk of exposure to hazardous radiation:

- Do not try to open the laser device enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only Compaq Authorized Service technicians to repair the laser device.

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Compliance with CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All Compaq systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the Compaq supplied laser device.

This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in your product.

Laser Information

Laser Type	Semiconductor GaAlAs
Wave Length	780 nm +/- 35 nm
Divergence Angle	53.5 degrees +/- 0.5 degrees
Output Power	Less than 0.2 mW or 10,869 W·m-2 sr-1
Polarization	Circular 0.25
Numerical Aperture	0.45 inches +/- 0.04 inches

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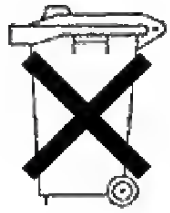
Battery Replacement Notice

Your computer is provided with a Lithium Manganese Dioxide, Vanadium Pentoxide, or alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement must be done by a Compaq authorized service provider using the Compaq spare designated for this product. For more information about battery replacement or proper disposal, contact your Compaq authorized reseller or your authorized service provider.

WARNING: Your computer contains an internal lithium manganese dioxide, vanadium pentoxide, or alkaline battery pack. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C.
- Do not disassemble, crush, or puncture the battery.
- Do not short external contacts on the battery or dispose of it in fire or water.
- Replace only with the Compaq spare battery designated for this product.



Batteries, battery packs, and accumulators should not be disposed of together with general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to Compaq, your authorized Compaq Partners, or their agents.

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Appendix B

Electrostatic Discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

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Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have a Compaq authorized reseller install the part.

NOTE: For more information on static electricity or assistance with product installation, contact your Compaq authorized reseller.

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Appendix C

Server Error Messages

POST Error Messages

All Power-On Self-Test (POST) error messages provided for this server are included in the *Compaq Servers Troubleshooting Guide*. For a complete listing of possible error messages generated during POST, along with steps to take to correct each problem, refer to the *Compaq ProLiant Servers Troubleshooting Guide*.

ADU Error Messages

All Array Diagnostic Utility (ADU) error messages provided for this server are included in the *Compaq Servers Troubleshooting Guide*. For a complete listing of possible error messages generated by ADU, along with steps to take to correct each problem, refer to the *Compaq ProLiant Servers Troubleshooting Guide*.

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Appendix D

Status Indicators and Switches

LED Indicators

There are a variety of status LEDs located on the front, back, and inside of your server. These LEDs communicate the current status of varying aspects of your server's components and operations, thus aiding you in diagnosing problems. The following ProLiant ML750 server LEDs are explained in this chapter.

- System interlocks LEDs (on the front of the server)
- Hot-Plug SCSI hard drive LEDs (on the front of each hard drive)
- Power supply LEDs (on the rear of the server)
- Hot-Plug I/O Fan LEDs (one on each fan, inside the server)
- Hot-Plug Redundant Front Processor Fan LEDs (on the front of the server)
- Hot-Plug Redundant Rear Processor Fan LEDs (on the rear of the server)
- PCI Hot Plug LEDs (on the rear of the server)

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System Interlock Status LED Indicators

The system LED on the front panel of the server turns amber to indicate that the interlock chain has been broken.

IMPORTANT: To check system interlock status indicator LEDs, place the server in STANDBY mode with the power supplies plugged in.

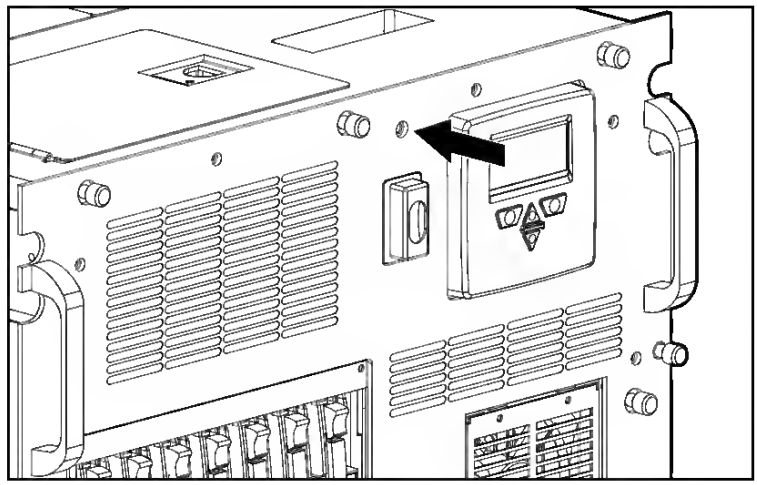

Figure D-1. System LED

Figure D-2 and Table D-1 show the location and identification of the system interlock status indicator LEDs on the I/O board.

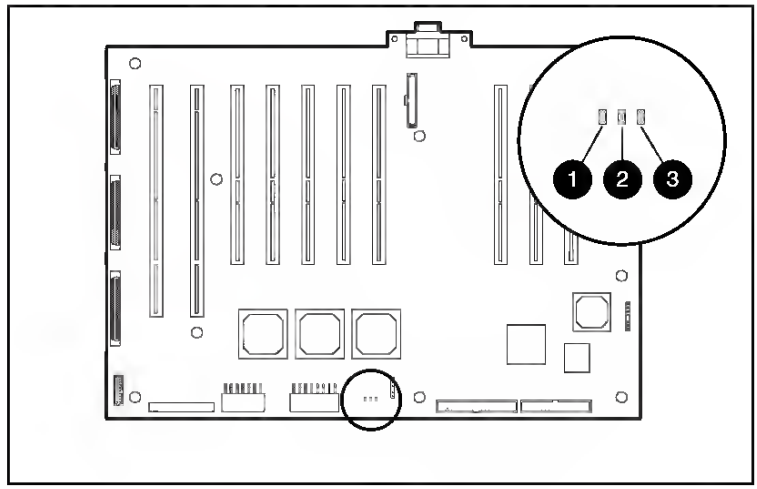

Figure D-2. System interlock status indicator LEDs on the I/O board

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Table D-1
System Interlock LED Status

❶ Aux 5V LED	❷ Power Fail LED	❸ System Interlock LED	Possible Affected Components to Check
ON	OFF	OFF	None (all normal) OR If the server will not power up: 1. Reinsert the power supply 2. Place the ON/Standby switch to ON 3. Verify the Power Supply Status LED blinks green for 10-20 seconds and then is solid green when the server powers on
ON	OFF	ON	Power cables I/O to Processor Board connection Processor Board components (see Table D-2)
ON	ON	OFF	Processor Power Modules Power supplies Power cables

Note: See Appendix E for component location.

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Figure D-3 and Table D-2 show the location and identification of the system interlock status indicator LEDs on the Processor board.

If the System Interlock LED is lit, locate the 11 LEDs on the Processor Board ❶.

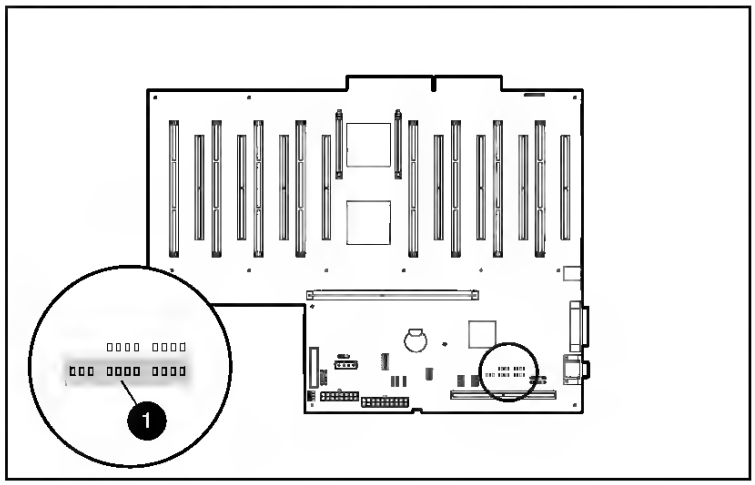

Figure D-3. Processor board LEDs

Count the number of LEDs lit on the processor board and refer to Table D-2 to determine possible failure points.

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Table D-2
Processor Board Interlock LED Status

Number of LEDs Lit	Failure Point
0	Processor Board connection Power cables in I/O area
1	Removable Media Bay
2	Memory Board
3	Cables from the I/O or Processor Board to the Power Supply Backplane (including the ribbon cable)
4	Processor Slot 8
5	Processor Slot 7
6	Processor Slot 6
7	Processor Slot 5
8	Processor Slot 4
9	Processor Slot 3
10	Processor Slot 2
11	Processor Slot 1

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Hot-Plug SCSI Hard Drive LED Indicators

The hot-plug SCSI hard drive LED indicators, located on each physical drive, are visible on the front of the server or external storage unit. They provide:

❶ Activity, ❷ Power/Online, and ❸ Fault status for each corresponding drive when configured as a part of an array, and attached to a powered-on controller. Their behavior may vary, depending on the status of other drives in the array.

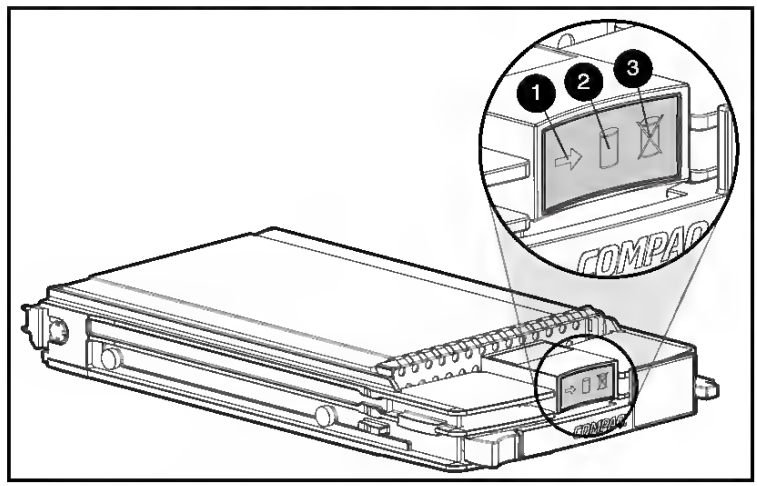

Figure D-4. Hot-Plug SCSI hard drive LED indicators

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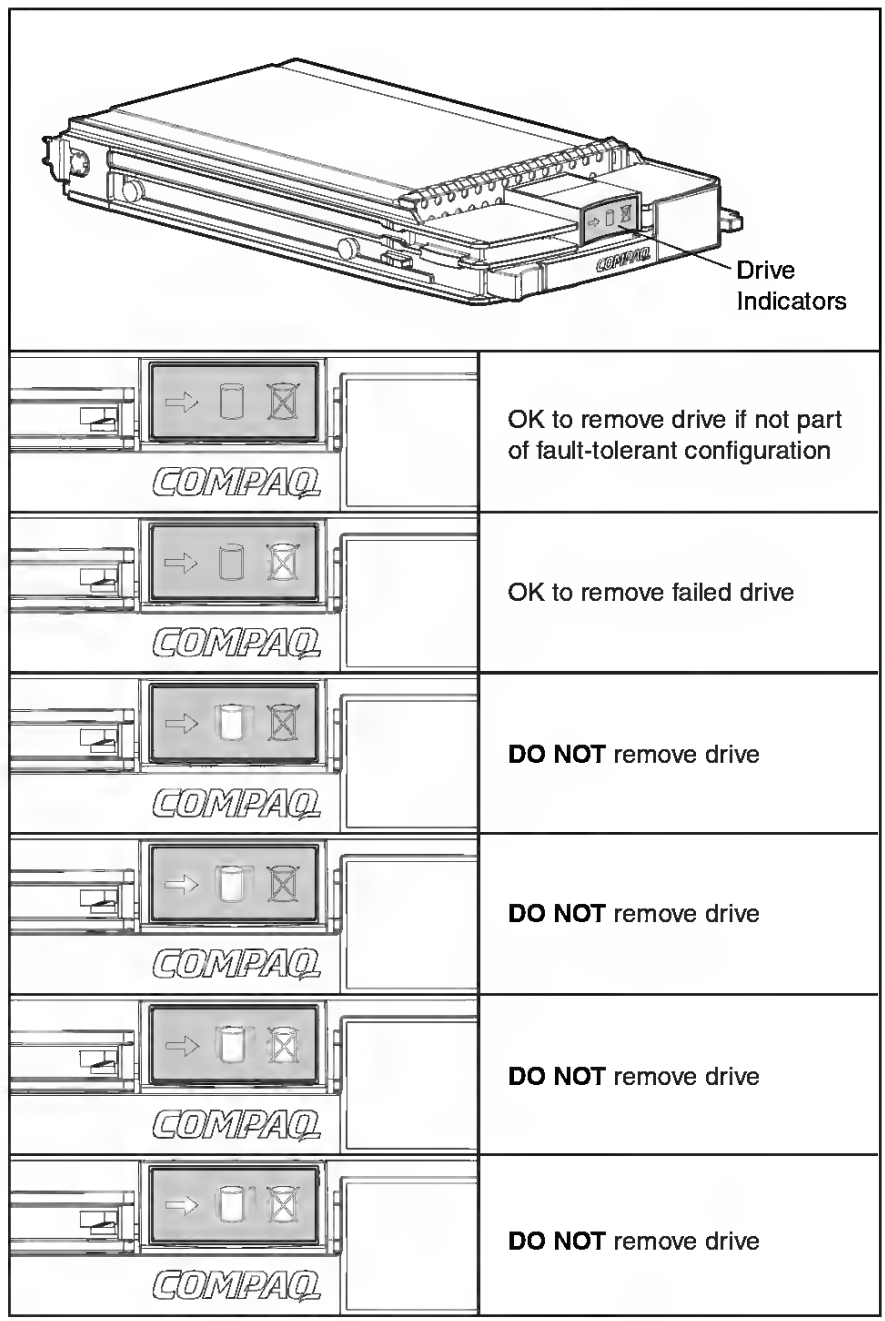

Figure D-5. SCSI hard drive LED indicators

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Power Supply LED Indicators

Each power supply has status and AC power indicators. See Figure D-6 and Table D-3 for a detailed description of both indicators.

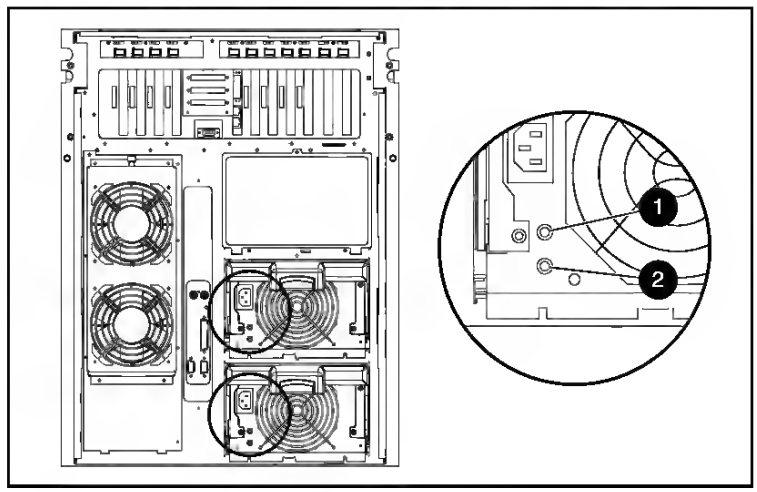

Figure D-6. Power supply indicators

Table D-3
Power Supply Indicators

Item	Condition	Meaning
❶ Status ⚠	Green	Normal operation
	Green/Amber alternating	Power supply failed to restart after a prolonged fault
	Green flashing	Power supply will restart within 20 seconds
	Amber	Fault detected in this power supply
	Amber flashing	Failed self-test
	Off	System in standby mode or interlocks disabled
❷ AC Power ☼	Green	AC power is connected to this power supply
	Off	No AC power is connected to this supply

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Hot-Plug I/O Fan LED Indicators

CAUTION: Never remove both hot-plug fans while the server is powered up. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown in the event of overheating.

NOTE: The hot-plug fan LED indicators are not part of the fan housing. The figure above shows the LED indicators as if the fan were installed in the server.

The ProLiant ML750 server ships with two hot-plug I/O fans. Each fan has LED indicators that indicate the status of the fan as follows:

- No light—power is not applied to the fan
- Green light ❷—power is applied to the fan and the fan is functional
- Amber light ❶—fan has failed

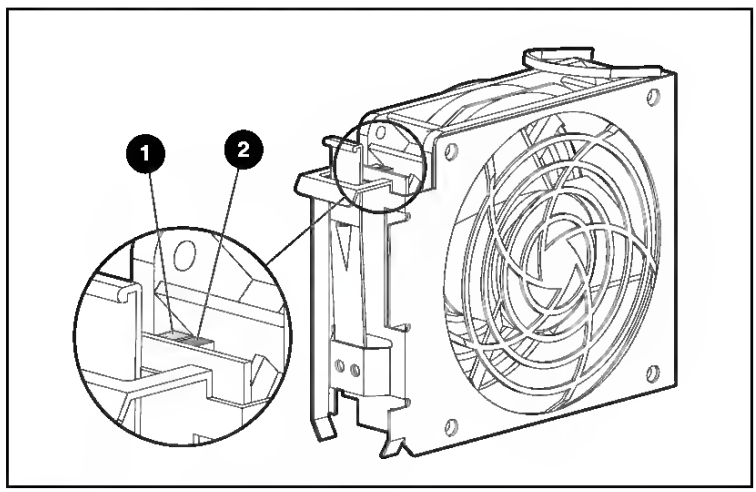

Figure D-7. Hot-plug fan LED indicators

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Hot-Plug Redundant Front Processor Fan LED Indicators

WARNING: To reduce the risk of injury or damage to the equipment, do not remove the internal processor fan assembly (Fan 4) while the server is powered up. Fan 4 is NOT hot-plug capable. For information on placing the server in Standby and disconnecting the power cords, see Chapter 2, "Server Installation."

The ProLiant ML750 server ships with two front processor fans. The internal front processor fan (Fan 4) is not hot-pluggable. The outer front processor fan (Fan3) is hot-pluggable. Each fan has LED indicators that indicate the status of the fan as follows:

- No light—power is not applied to the fan
- Green light ❶—power is applied to the fan and the fan is functional
- Amber light ❷—fan has failed

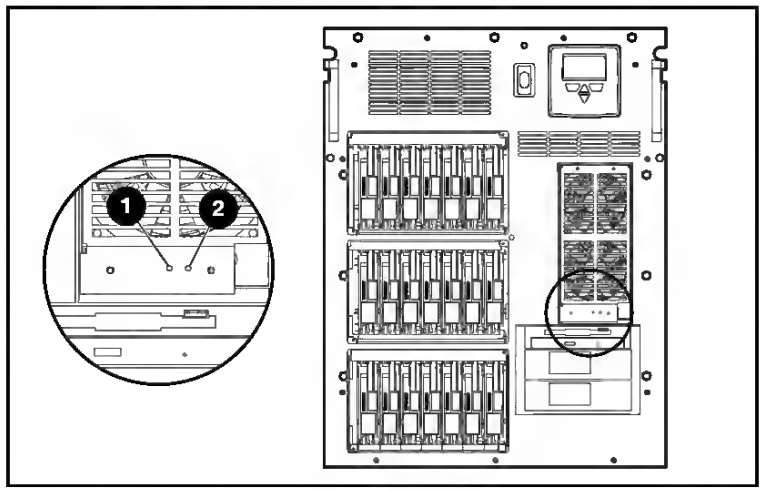

Figure D-8. Hot-plug front processor fan (Fan 3) LED indicators

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Hot-Plug Redundant Rear Processor Fan LED Indicators

WARNING: To reduce the risk of injury or damage to the equipment, do not remove the internal processor fan assembly (Fan 5) while the server is powered up. Fan 5 is not hot-plug capable. For information on placing the server in Standby and disconnecting the power cords, see Chapter 2, "Server Installation."

The ProLiant ML750 server ships with two rear processor fans. The internal rear processor fan (Fan 5) is not hot-pluggable. The outer rear processor fan (Fan 6) is hot-pluggable. Each fan has LED indicators that indicate the status of the fan as follows:

- No light—power is not applied to the fan
- Green light ❶—power is applied to the fan and the fan is functional
- Amber light ❷—fan has failed

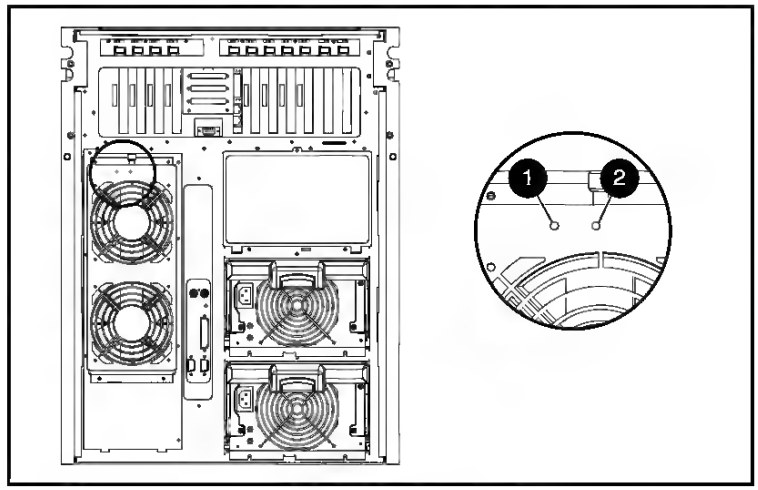

Figure D-9. Hot-plug redundant front processor fan LEDs

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PCI Hot Plug LED Indicators

The PCI Hot Plug amber LED ❶ and green LED ❷ provide a visual reference to the status of each slot. The LEDs are viewed from the rear of the server or by opening the PCI Hot Plug access doors on the top panel.

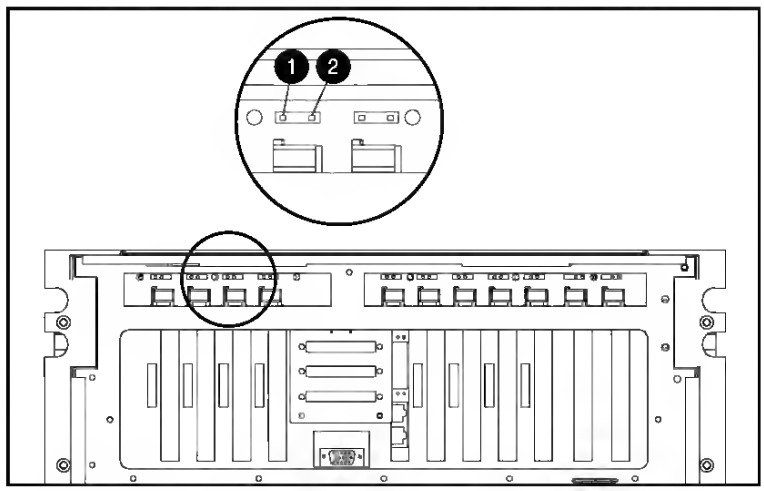

Figure D-10. PCI Hot Plug LEDs from rear of server

Table D-4 indicates the appropriate slot condition and status for each state of the two LED indicators.

Table D-4
PCI Hot Plug LED Indicators

Amber LED	Slot Status	Green LED	OK to Open	Slot Status
Off	Slot does not require attention	On	No	Power is applied to slot.
On	Slot requires attention. There may be a problem with the slot, the PCI board, or the driver. Check the green LED before opening the slot.	Flashing	No	Power to the slot is being turned off or on. This process may take several minutes. DO NOT open the slot release lever until the green LED is completely off.
		Off	Yes	You can replace or remove the board in this slot only.

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System Board Switches

Processor Board Bus/Core Frequency Ratio Switch Settings

Processor board bus/core frequency ratio switches can be set manually or by the system BIOS. Figure D-11 shows the location of the processor board bus/core frequency ratio switches. Table D-5 shows the bus/core frequency ratio switch settings.

CAUTION: Setting the processor switchbanks incorrectly can result in permanent damage to the processor or in data loss.

IMPORTANT: The bus/core switches come set at the Off position. This allows the ROM to automatically set the optimal speed for the buses. The server will not start if the switches are set to a speed higher than the slowest processor.

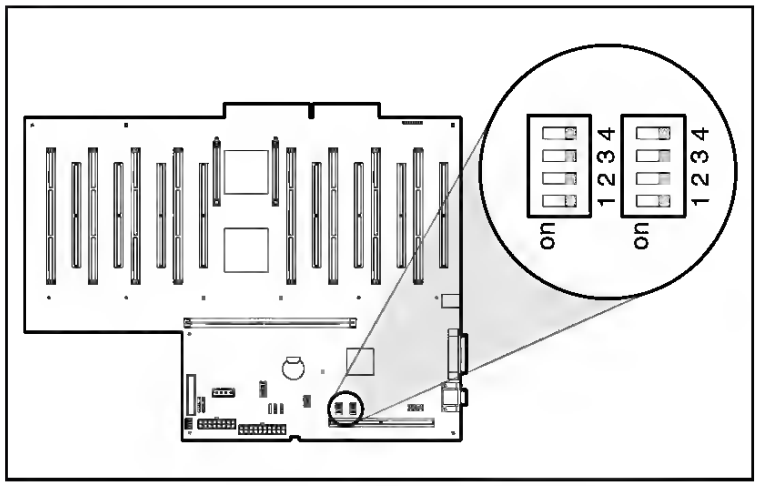

Figure D-11. Processor board bus/core switches

Table D-5
Processor Board Bus/Core Frequency Ratio Switch Settings

Bus/Core Frequency	Ratio	SW 1	SW 2	SW 3	SW 4
ROM	Auto	OFF	OFF	OFF	OFF

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Configuration Switch Settings

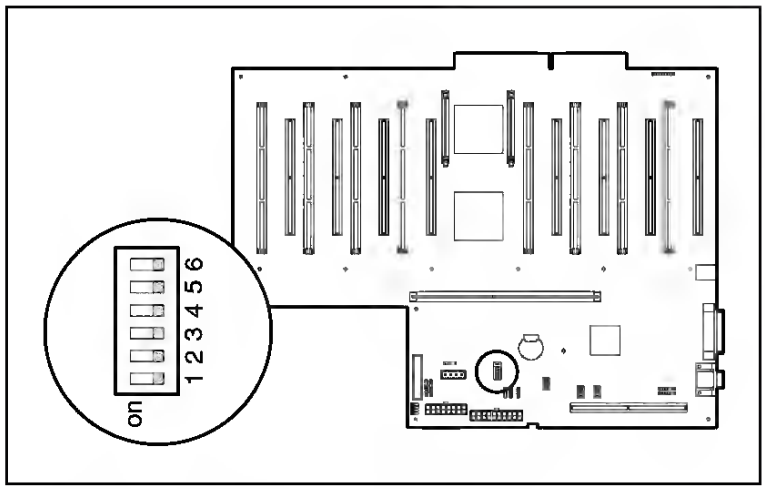

Figure D-12. Configuration switch settings location

Table D-6
Configuration Switch Settings

Switch Number	Function	Enable	Disable
SW1	On Board Video	OFF	ON
SW2	Configuration Lock	ON	OFF
SW3	Reserved	OFF	ON
SW4	Diskette Boot Override	ON	OFF
SW5	Boot Password	OFF	ON
SW6	Clear NVRAM	ON	OFF

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Appendix E

Troubleshooting

This appendix provides step-by-step instructions on what to try and where to go for help for the most common problems encountered during the initial Power-On Self-Test (POST). The server must complete this test each time you power up your server, before the server can load the operating system and start running software applications.

WARNING: There is a risk of personal injury from hazardous energy levels. The installation of options and routine maintenance and service of this product shall be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

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When the Server Does Not Start

Complete these steps if the server does not start:

1. Verify that the computer and monitor are plugged into a working outlet.
2. Make sure your power source is working properly:
   - ❑ Check status using the system LED indicator. See Appendix D for the location of the system LED.
   - ❑ Was the momentary contact power switch pressed firmly?

     See "System Power" in Chapter 3 for an explanation of this operation.

     Refer to the "Power Source" section in the *Compaq Servers Troubleshooting Guide* for details on what else to check.
3. Make sure the power supplies are working properly.
   - ❑ Check status using the power supply LED indicators. See the "Power Supply LED Indicators" section in Appendix D for the location of these LEDs, and an explanation of statuses.
   - ❑ Also refer to the "Power Source" section in the *Compaq Servers Troubleshooting Guide.*
4. If the system does not complete the Power-On Self-Test (POST) or start loading an operating system, refer to the "General Loose Connections" section in the *Compaq Servers Troubleshooting Guide.*
5. If the server is power cycling, verify that the system is not rebooting due to an Automatic Server Recovery-2 (ASR-2) reboot caused by another problem.

   In the *Compaq Servers Troubleshooting Guide,* refer to:
   - ❑ "Automatic Server Recovery-2 (ASR-2)"
   - ❑ "System Short" for other reasons for power cycling

   NOTE: ASR-2 can be enabled to restart your server, automatically loading the operating system. Should a critical error occur, ASR-2 will log the error in the Integrated Management Log (IML) and restart the server. The system ROM will then page the designated administrator and execute the normal restart process.
6. Restart the server.

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7. Check the Integrated Management Display (IMD) for the following "normal power-up sequence" to verify that your system meets the minimal hardware requirements and is powered up under normal operation:
   a. The front panel system LED turns from standby (blinking green) to on (solid green).
   b. The fans start up.
   c. The IMD displays messages regarding the server name and LCD firmware version.
   d. The IMD displays messages regarding server initialization in the following sequence:
      - ❑ System initialization
      - ❑ PCI auto-configuration
      - ❑ Video initialization if a monitor is connected, it also displays the Compaq initialization screen.
      - ❑ Processor initialization
      - ❑ Memory test
      - ❑ Memory initialization
      - ❑ Diskette drive
      - ❑ Option ROM
      - ❑ SCSI devices
8. The operating system loads to complete the boot process.

If this does not solve the problem, continue with the following section, "Diagnosis Steps."

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Diagnosis Steps

If your server does not power up, or powers up but does not complete the Power-On Self-Test (POST), answer the questions in the following table to determine appropriate actions based on the symptoms observed. Based on the answers you give, you will be directed to the appropriate table in the section immediately following. This table outlines possible reasons for the problem, options available to assist in diagnosis, possible solutions available, and references to other sources of information.

Table E-1
Diagnosis Steps

Question	Action
Question 1: Did the power supply turn on?	If yes, go to Question 5. If no, see Table E-2 for details. Continue to Question 2.
Question 2: Is the front panel system LED on?	If off, continue to Question 3. If amber, go to Question 4. If green, go to Table E-3.
Question 3: Is the auxiliary power LED indicator on?	If yes, continue to Question 4. If no, go to Table E-4.
Question 4: Are any of the system interconnect LED indicators on?	Go to Table E-5.
Question 5: Is the integrated management display (IMD) on, or does the server have video?	If no, go to Table E-6. If yes, the IMD or monitor is available for diagnosis. Determine next action by observing POST progress and error messages. Refer to "POST Error Messages" in the *Compaq Servers Troubleshooting Guide* for a complete description of each POST error message.

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Table E-2
Did the Power Supply Turn On?

Check to see if the power supply and system fans are running. Verify this visually.

Answer	Possible Reasons	The Next Step
No	Power switch has not been pressed.	Press the power switch.
	There is a broken connection between the system board and power switch.	If the server does not start, further information is needed.
	No AC power.	Go to Question 3 in Table E-1.
	A power supply problem exists. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed.	
	The power supply backplane may need to be replaced.	
	There is a broken cable connection between the system and backplane.	
	A system interconnect problem exists.	
Yes	A power supply problem may exist. A power supply may have an internal problem, may have a damaged connector, or it may have failed.	If your power supply starts, and you can verify operation of the power supply and system fans, then you may assume that the following is true: ■ AC power is connected to the power supply and providing adequate power. ■ The cable connection between the system and backplane is good. ■ The connection between the system board and power switch is good. ■ No system interconnect problem exists.
	The power supply backplane may need to be replaced.	More information is needed. Go to Table E-6.

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Table E-3
Did the System LED on the Front Panel Turn On?

See "System Interlock Status LED Indicator" in Appendix D.

Answer	Possible Reasons	The Next Step
No	There is a broken connection between the system board and power switch. The system is not connected to AC power, or no AC power is available. A power supply problem exists. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed. The power supply backplane may need to be replaced. There is a broken cable connection between the system and backplane. A system interconnect problem may exist.	Further information is needed. Go to Question 4.
Yes, amber	A temperature violation may have occurred, causing a thermal shutdown. The system may be trapped in reset. A system interconnect problem exists.	The system interconnect LED indicators have power connected and can be used for further diagnosis. Go to Table E-5.

continued

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Table E-3
Did the System LED on the Front Panel Turn On? *continued*

Answer	Possible Reasons	The Next Step
Yes, green	If the system LED is green, and the power supply LED is amber: ■ A power supply problem may exist. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed. ■ The power supply backplane may need to be replaced. ■ Nonvolatile RAM (NVRAM) may be corrupted. ■ The system ROM may be corrupted.	If system LED is on then you may assume that the following is true: ■ AC power is connected to the power supply and providing adequate power. ■ The power supply 14 pin signal header cable is connected properly. ■ The cable connection between the system and backplane is good. ■ The connection between the system board and power switch is good. 1. Verify installation of the power supplies and check all connections. 2. You may try clearing NVRAM. If it is necessary to clear NVRAM, see Appendix D for the correct switch setting and procedure. 3. You may try performing ROMPaq disaster recovery to replace a corrupted system ROM image. If it is necessary to perform ROMPaq disaster recovery, see Appendix D for the correct switch settings. Refer to the *Compaq Servers Troubleshooting Guide* for procedures on ROMPaq disaster recovery. 4. If these steps do not solve the problem, contact your Compaq authorized service provider for assistance.
	If both the system LED and the power supply LED are green, then a processor board, system board or I/O board is failed.	Contact your Compaq authorized service provider for assistance.

IMPORTANT: Slots one and two in memory bank one must be populated when performing ROMPaq disaster recovery.

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Table E-4
Is the Auxiliary Power LED On?

See "System Interlock Status LED Indicator" in Appendix D for the location of this LED indicator.

IMPORTANT: The auxiliary power LED indicator is located on the system board. To check the auxiliary power LED indicator, the server should be placed in standby mode with the power supplies plugged in.

Answer	Possible Reasons	The Next Step
No	The auxiliary power LED indicator may be burned out and need to be replaced. The system is not connected to AC power, or no AC power is available. A power supply problem exists. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed. The power supply backplane may need to be replaced. There is a broken cable connection between the system and backplane.	Auxiliary power is the power source for the system interconnect LED indicator indicators. If that power source does not exist, the system interconnect LED indicator indicators do not light to indicate system interconnect problems. This is also an indication that there is a problem other than the system interconnect preventing the power supply from turning on. ■ Check your power source to verify an adequate supply of AC power. ■ Remove the power supply and check for a damaged connector. If connector appears okay, reinsert the power supply, firmly and correctly. ■ Check for bent pins on all power cables. ■ Verify the proper connection of all power cables. Refer to "Power Problems" and "General Hardware Problems" in the *Compaq Servers Troubleshooting Guide* for further options.

continued

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Table E-4
Is the Auxiliary Power LED On? *continued*

Answer	Possible Reasons	The Next Step
Yes	There is a broken connection between the system board and power switch. A power supply problem may exist. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed. The power supply backplane may need to be replaced. There is a broken cable connection between the system and backplane. A system interconnect problem exists.	The system LED is not on, but there is auxiliary power. The power switch cable may not be connected to the system board. Try reconnecting the power switch cable. The system interconnect LED indicator indicators have power connected and can be used for further diagnosis. Go to Table E-5.

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Table E-5
Are all of the System Interconnect Status LED Indicators Off?

See "System Interlock LED Indicators" in Appendix D.

IMPORTANT: To prevent damage to critical system components, the ProLiant ML750 server will not power up if it senses that certain components are not installed, or are installed incorrectly. The system interconnect LED indicator indicators provide a closed-loop checking mechanism for verifying proper component mating between critical server components. These indicators are located in the I/O Module in front of the system fans. They are operated using standby power provided by the power supplies. To check system interconnect LED indicators, the server should be placed in standby mode with the power supplies plugged in.

Answer	Possible Reasons	The Next Step
No	If a system interconnect LED indicator corresponding to a component or module is on, then the corresponding component or module is missing or not seated properly.	Reseat the component represented by the system interconnect LED indicator.
	This could include, any processor, Processor Power Module (PPM), the memory board, a fan, or the I/O module, processor and memory module, or media module.	
	If the emergency shutdown system interconnect LED is on, AC power to the system has been cut to avert imminent component damage and data loss.	Check for bent pins on the midplane and power supply which may have caused a short.
		Verify that the fans are working properly.
	The terminator PPM may have failed.	Check the integrated management log (IML) as soon as possible to view messages which indicate the component causing the shutdown.
	The fan controller has stopped responding.	
	The system has recorded a temperature violation.	
	A short circuit may have occurred.	
	If the reset LED is on, the system is in reset.	Check for failed PPMs. When a PPM has failed, a red LED can be viewed through the grate on the processor and memory module drawer.
	A power supply may have stopped providing adequate power as per system specifications	
	The system may have experienced a short	Reseat the system boards.
	A PPM may have failed.	Check for bent pins on the midplane.
	A reboot may have been initiated via Automatic Server Recovery (ASR-2).	Verify that the power supplies are functioning properly.

continued

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Table E-5
Are all of the System Interconnect Status LED Indicators Off? *continued*

Answer	Possible Reasons	The Next Step
Yes	There is a broken connection between the system board and power switch. A power supply problem may exist. The power supply may not be connected or inserted properly, may have a damaged connector, or it may have failed. The power supply backplane may need to be replaced. There is a broken cable connection between the system and backplane.	■ Check your power source to verify an adequate supply of AC power. ■ Remove the power supply and check for a damaged connector. If connector appears okay, reinsert the power supply, firmly and correctly. ■ Check for bent pins on all power cables. ■ Verify the proper connection of all power cables. Refer to "Power Problems" and "General Hardware Problems" in the *Compaq Servers Troubleshooting Guide* for further options.

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Table E-6
Is the IMD On or Does the Server Have Video?

Answer	Possible Reasons	The Next Step
Yes		Video is available for diagnosis. Determine next action by observing Power-On Self-Test (POST) progress and error messages. Refer to the *Compaq Servers Troubleshooting Guide* for a complete description of each POST error message.
No	Video may not be connected properly. Switches may not be set correctly on the system board. A processor has failed. A Processor Power Module (PPM) has failed, or is not seated properly.	Is a video card installed? Make sure the video cable is properly connected. Verify the video connections. Refer to "Video Problems" in the *Compaq Servers Troubleshooting Guide*. Verify the switch settings on the system board. See "System Board Switches" in Appendix D. Are there any audible indicators, such as a series of beeps? A series of beeps will be the audible signal indicating the presence of a POST error message. Refer to the *Compaq Servers Troubleshooting Guide* for a complete description of each beep sequence, and the corresponding error messages. Remove a single processor and the corresponding Processor Power Module. 1. Try reseating them firmly. 2. If this does not solve the problem, replace with a known good processor and Processor Power Module to identify the bad component.

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Problems After Initial Boot

Once your server has passed the Power-On Self-Test, you may still encounter errors, such as an inability to load your operating system. Use Table E-7 to troubleshoot server installation problems that occur after the initial boot.

Refer to "Software Problems" in the *Compaq Servers Troubleshooting Guide* for more information.

For updated information on supported operating systems, log on to the Internet at

http://www.compaq.com/products/servers/platforms/

Table E-7
Problems After Initial Boot

Problem	Possible Cause	Possible Solution
System cannot load SmartStart.	SmartStart requirement not performed.	Check the SmartStart Release notes provided on the SmartStart Online Reference Information on the SmartStart and Support Software CD.
	IDE cable not connected to CD-ROM.	Check the cable between system board and CD-ROM to ensure proper connection.
	Insufficient memory available.	A rare "Insufficient Memory" message may display the FIRST time SmartStart is booted on certain unconfigured systems. Simply cold-boot the machine with the SmartStart and Support Software CD inserted in the CD-ROM drive to correct the problem.
	Existing software is causing conflict.	*Run the Compaq System Erase Utility. Please read the caution below. Refer to the instructions in the *Compaq Servers Troubleshooting Guide*.
SmartStart fails during installation.	Error occurs during installation.	*Follow the error information provided. If it is necessary to reinstall, run the Compaq System Erase Utility. Refer to the instructions in the *Compaq Servers Troubleshooting Guide*.
	CMOS not cleared.	*Run the Compaq System Erase Utility. Read the caution below. Refer to the instructions in the *Compaq Servers Troubleshooting Guide*.

***CAUTION:** The Compaq System Erase Utility will cause loss of all configuration information, as well as loss of existing data on all connected hard drives. Please read "Running the Compaq System Erase Utility" and the associated warning in the *Compaq Servers Troubleshooting Guide* prior to performing this operation.

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Table E-7
Problems After Initial Boot *continued*

Problem	Possible Cause	Possible Solution
Server cannot load operating system.	Required operating system step missed.	Follow these steps: 1. Note at which phase the operating system failed. 2. Remove any loaded operating system. 3. Refer to your operating system documentation. 4. Install again.
	Installation problem occurred.	Refer to your operating system documentation and to the SmartStart Release Notes on the SmartStart and Support Software CD. Use the ROM-based Setup Utility to troubleshoot where the installation failed.
	Problem encountered with the hardware you have added to the system.	Refer to the documentation provided with the hardware. Run the ROM-based Setup Utility to determine if drives are properly attached to the primary boot controller. See Chapter 5 for instructions on correct SCSI bus cabling configuration for your unit.
	Problem encountered with hardware added to a new configure-to-order system (where available).	You must complete the factory-installed operating system software installation prior to adding new hardware to the system. Be sure you are following the instructions provided in the *Factory-Installed Operating System Software Installation Guide*. Remove the new hardware and complete the software installation. Then reinstall the new hardware.

Refer to the *Compaq Servers Troubleshooting Guide* for the following:

- Information you will need to collect when diagnosing software problems and to provide when contacting support
- Instructions on how to upgrade your operating system and its drivers. It also tells you what recovery options are available, and offers advice on minimizing downtime

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Compaq Remote-Flash Redundant ROM

Through subsequent boots of the server, if any integrity errors are detected by the Bootblock, the system will automatically launch the redundant image and continue the Power-On Self-Test (POST) process.

If this situation occurs, you will see a "105" error message indicating which system ROM is faulty. The ROMPaq utility flashes the failed system ROM to the latest released version.

During the flash process, the ROMPaq driver automatically detects which system ROM is inactive and flashes that system ROM with the image obtained from the ROMPaq diskette. When the flash process is complete, the server contains a fully redundant system ROM.

The system ROM can also be flashed remotely with the redundant ROM as a backup.

NOTE: If you are familiar with the process of flashing a Compaq server via the ROMPaq utility, there are no noticeable changes to the ROMPaq user interface. This feature is implemented in the ROMPaq driver and the system boot block only. User configuration of this feature is not required.

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Appendix F

Server Specifications and Connector Interfaces

Server Specifications

Table F-1
ProLiant ML750 Server Specifications

Dimensions		
Height	26.75 in	67.9 cm
Depth	27.68 in	70.3 cm
Width	19.25 in	48.9 cm
Weight (no drives and two power supplies)	161 lb	73.0 kg
Weight (no drives and no power supplies)	145 lb	65.8 kg
Input Requirements (per power supply)	Low Range	High Range
Rated Input Voltage	100 to 120 V	200 to 240 V
Rated Input Frequency	50 to 60 Hz	50 to 60 Hz
Rated Input Current	8 A	6 A
Input Power (W)	780 W	1700 W
Input Power (BTU/hr)	2662 BTU/hr	5802 BTU/hr
Power Supply Output Power (per power supply)	Low Range	High Range
Rated Steady-State Power	500 W	1150 W
Maximum Peak Power	549 W	1180 W
Temperature Range (see Note)		
Operating	50° to 95°F	10° to 35°C
Shipping	-22° to 122°F	-30° to 60°C

continued

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Table F-1
ProLiant ML750 Server Specifications *continued*

Table F-2
ProLiant ML750 Server Specifications

Relative Humidity (non-condensing)		
Operating	20% to 80%	20% to 80%
Non-operating	5% to 90%	5% to 90%
Maximum Wet Bulb Temperature	101.7°F	38.7°C

Note: All temperature ratings shown are for sea level. There is an altitude derating of 1.8°F per 1,000 ft to 10,000 ft (1°C per 300 m to 3,000 m).

Connector Interfaces

The following connectors are supported for your server:

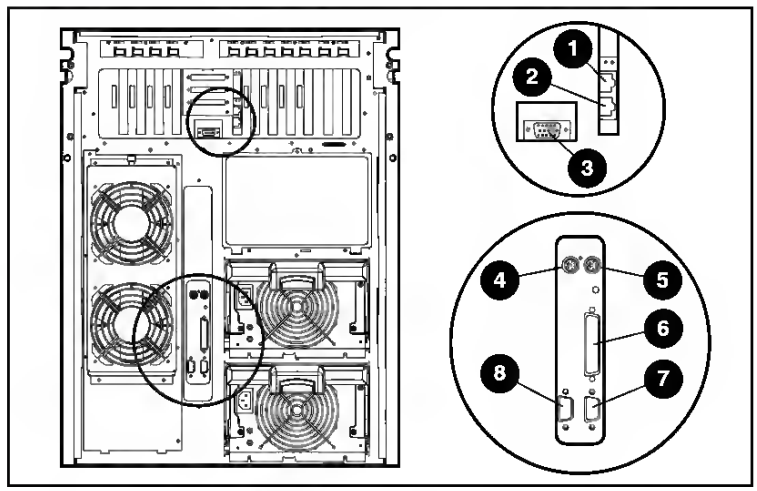

Figure F-1. Rear connector interface locations

Table F-3
Connector Interface Locations

Item	Component	Item	Component
❶	Ethernet (RJ-45) 10/100	❺	Mouse
❷	Ethernet (RJ-45) 10/100	❻	Parallel
❸	Video	❼	Serial A
❹	Keyboard	❽	Serial B

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Appendix G

Internal CD-ROM Drive

The internal CD-ROM drive is a random access, read-only storage device capable of retrieving data from removable compact disc media and storing up to 680 MB of digital information.

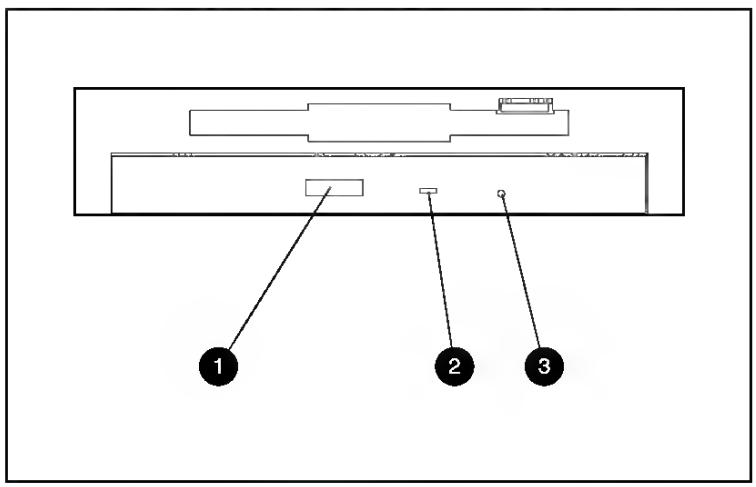

Figure G-1. Internal CD-ROM front panel

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Table G-1
Internal CD-ROM

Ref	Component	Function
❶	Load Button	Opens the disc tray
❷	Busy Indicator	Turns green when a CD is present; flashes amber when the drive is reading a CD
❸	Manual Eject Hole	Ejects a CD if the load button is inoperable

Opening the Tray Manually

If the tray will not open automatically, you can open it manually by using the emergency load button.

NOTE: Certain applications or operating system software may disable the load button to prevent accidental damage to the disc. If the load button is disabled by the application software, it will not operate.

CAUTION: Before beginning this procedure, place the server in Standby.

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1. Insert a metal rod, such as a straightened paper clip, into the manual eject hole and push firmly. The tray releases.

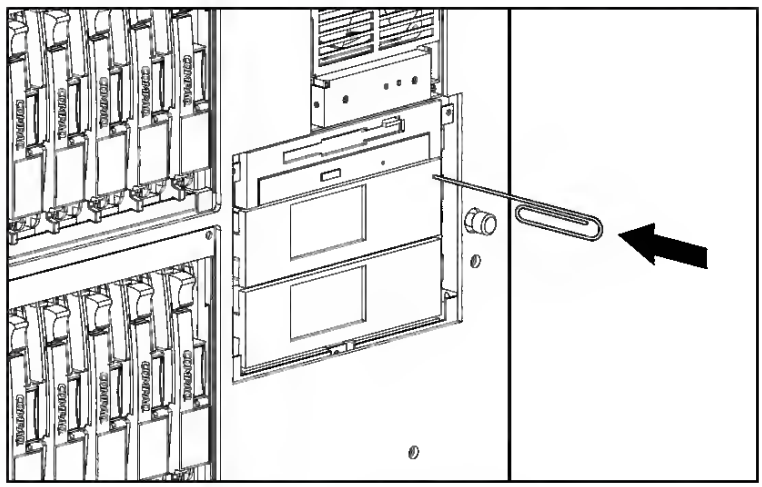

Figure G-2. Opening the Internal CD-ROM tray manually

2. Slowly pull the tray out from the drive until the tray is fully extended, then remove the disc.

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Appendix H

Processor Board and I/O Board

Processor Board

Processor board components are shown in Figures E-1 and E-2.

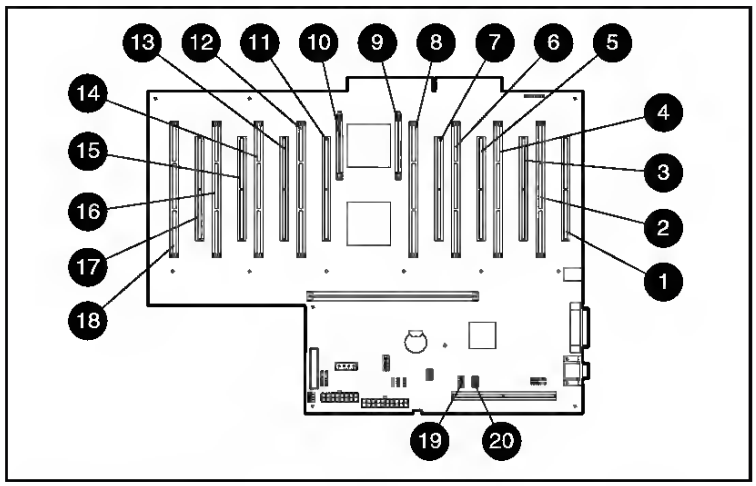

Figure H-1. Processor board with processor and Processor Power Module slots and bus/core ratio switches

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Table H-1
Processor/Processor Power Module Slots and Associated Bus/Core Ratio Switch Locations

Item	Component	Item	Component
❶	Processor Power Module Slot 1	⓫	Processor Power Module Slot 5
❷	Processor Slot 1	⓬	Processor Slot 5
❸	Processor Power Module Slot 2	⓭	Processor Power Module Slot 6
❹	Processor Slot 2	⓮	Processor Slot 6
❺	Processor Power Module Slot 3	⓯	Processor Power Module Slot 7
❻	Processor Slot 3	⓰	Processor Slot 7
❼	Processor Power Module Slot 4	⓱	Processor Power Module Slot 8
❽	Processor Slot 4	⓲	Processor Slot 8
❾	Cache Accelerator Slot 1	⓳	Processor Bus 2 Bus/Core Ratio Switch
❿	Cache Accelerator Slot 2	⓴	Processor Bus 1 Bus/Core Ratio Switch

CAUTION: The bus/core ratio switches should be set at the default (all switches OFF). This allows the ROM to automatically set the optimal speed for the buses. The server will not boot if the bus/core ratio switches are set to a speed higher than the slowest processor installed in the server.

Failure to properly set the bus/core ratio switches could cause damage to the server and could void your warranty. Compaq recommends that the default bus/core ratio settings be used to allow the ROM to set the speed of the buses.

NOTE: If the bus/core ratio switches are manually set, the bus/core ratio is the same for all processors on both buses. Processor Bus 1 includes Processors 1 through 4. Processor Bus 2 includes Processors 5 through 8.

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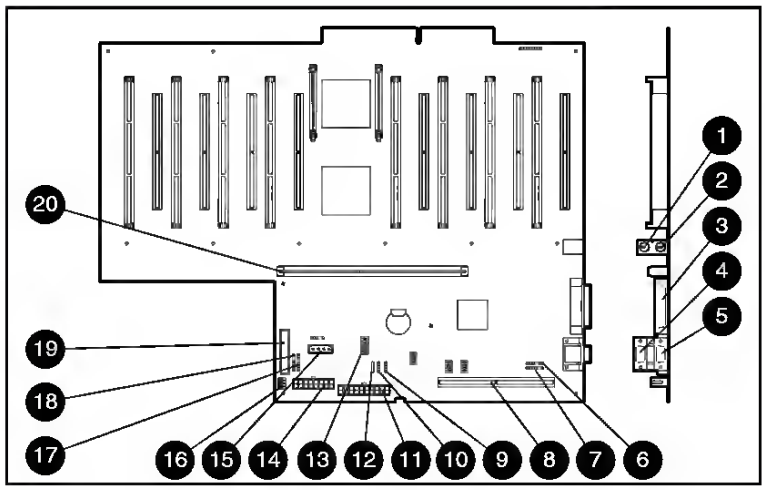

Figure H-2. Processor board components

Table H-2
Processor Board Components

Item	Component	Item	Component
❶	Keyboard connector	⓫	22-pin power connector
❷	Mouse connector	⓬	Internal/external battery switch
❸	Parallel connector	⓭	Configuration switch
❹	Serial B connector	⓮	18-pin power connector
❺	Serial A connector	⓯	Removable media power connector
❻	Internal rear processor fan connector	⓰	Air sensor/interlock bypass connector
❼	Hot-plug redundant rear processor fan connector	⓱	Hot-plug redundant front processor fan connector
❽	Processor Board Processor Power Module Slot	⓲	Internal front processor fan connector
❾	External battery connector	⓳	Diskette drive connector
❿	External battery connector	⓴	Memory expansion board connector

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Table H-3
Configuration Switch Settings

Switch		Enable	Disable
1	On-Board Video	OFF	ON
2	Configuration Lock	ON	OFF
3	Reserved	OFF	OFF
4	Diskette Boot Override	ON	OFF
5	Boot Password	OFF	ON
6	Clear NVRAM	ON	OFF

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I/O Board

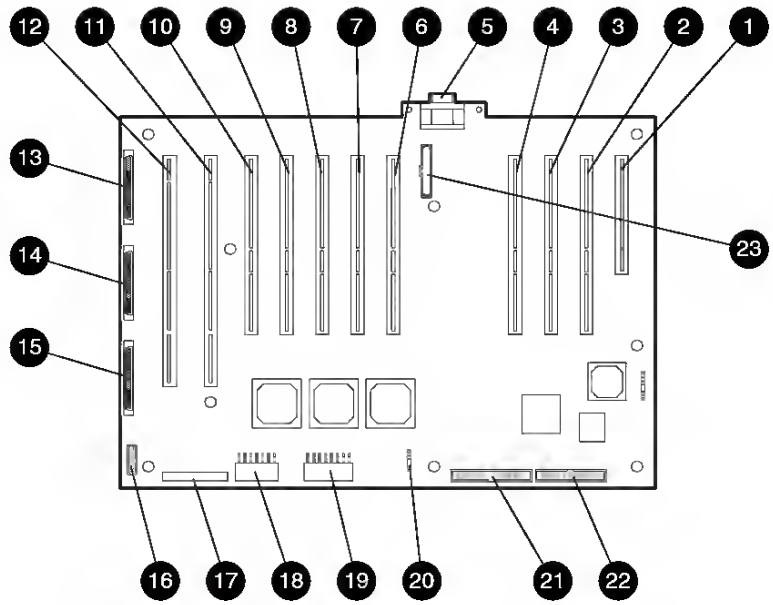

Figure H-3. I/O board

Table H-4
I/O Board Components

Item	Component	Item	Component
❶	32-bit/33-MHz PCI Hot Plug Slot 1	⓭	Slot 10/11 SCSI Port 3
❷	64-bit/33-MHz PCI Hot Plug Slot 2	⓮	Slot 10/11 SCSI Port 2
❸	64-bit/33-MHz PCI Hot Plug Slot 3	⓯	Slot 10/11 SCSI Port 1
❹	64-bit/33-MHz PCI Hot Plug Slot 4	⓰	Fan/speaker connector
❺	Video connector	⓱	Power/signal connector
❻	64-bit/33-MHz PCI Hot Plug Slot 5	⓲	14-pin power connector
❼	64-bit/33-MHz PCI Hot Plug Slot 6	⓳	16-pin power connector

continued

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Table H-4
I/O Board Components *continued*

Item	Component	Item	Component
❽	64-bit/33-MHz PCI Hot Plug Slot 7	⓴	System power
❾	64-bit/33-MHz PCI Hot Plug Slot 8	㉑	IDE connector (CD-ROM)
❿	64-bit/33-MHz PCI Hot Plug Slot 9	㉒	Integrated Management Display connector
⓫	64-bit/66-MHz PCI Hot Plug with Extended SCSI Slot 10	㉓	PCI Hot Plug connector
⓬	64-bit/66-MHz PCI Hot Plug with Extended SCSI Slot 11		

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